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FEBRUARY 1996 ISSUE #86

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See p. 38

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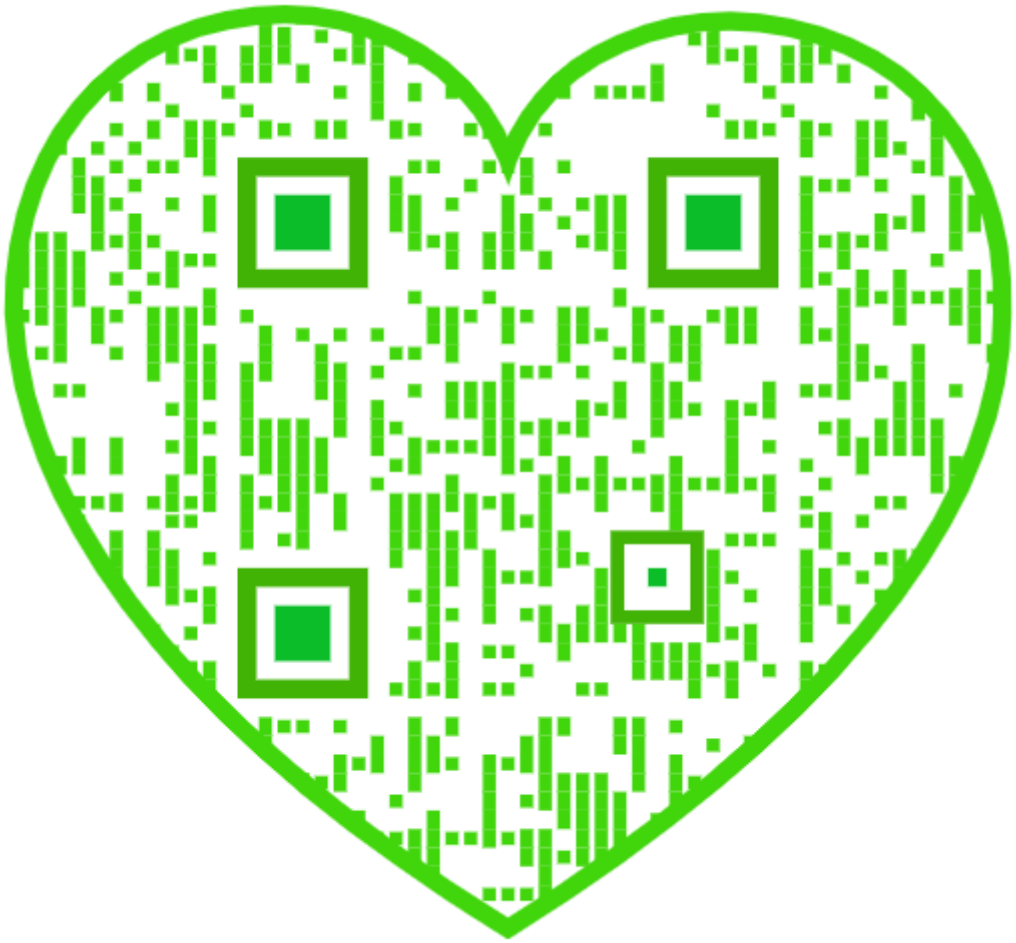

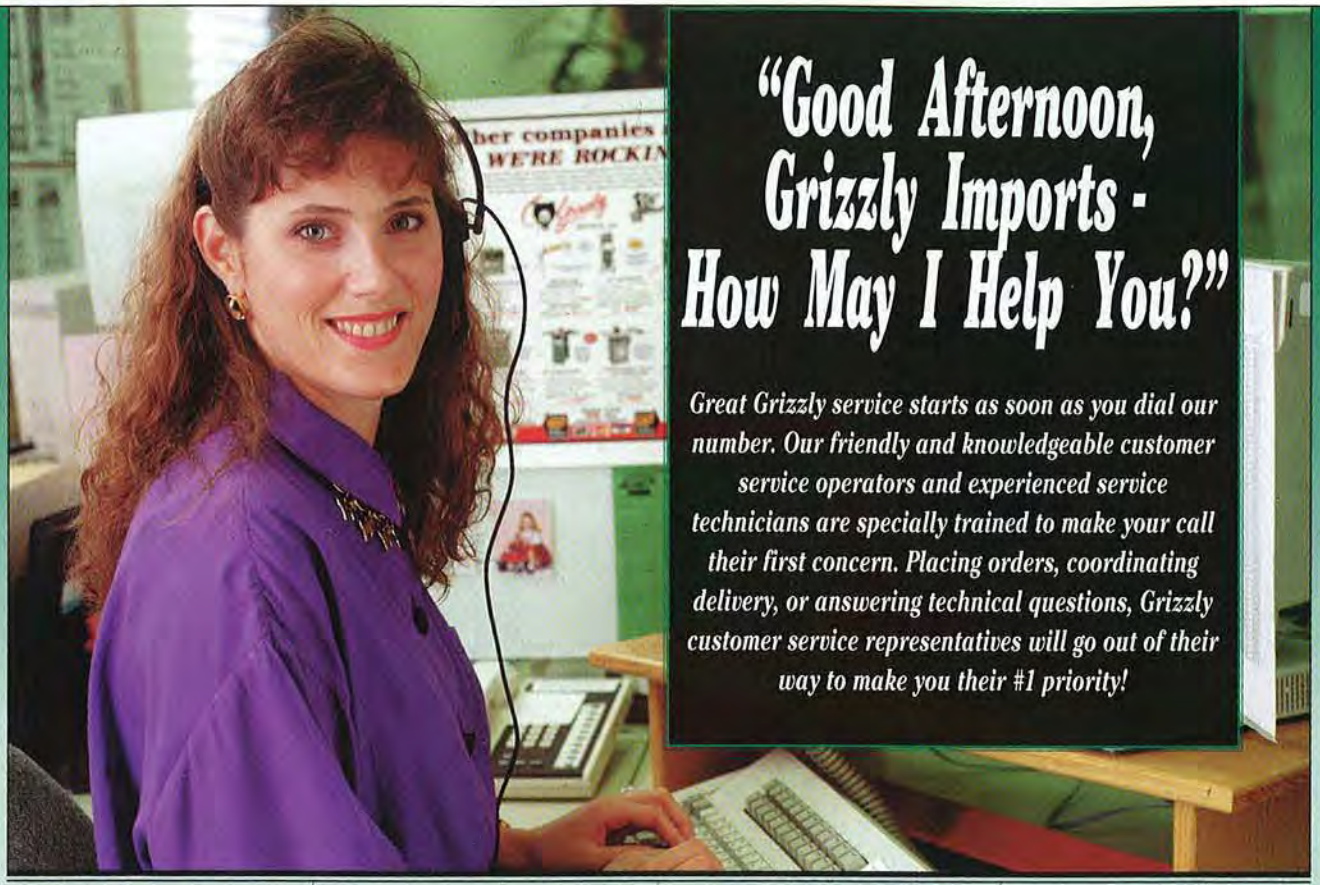

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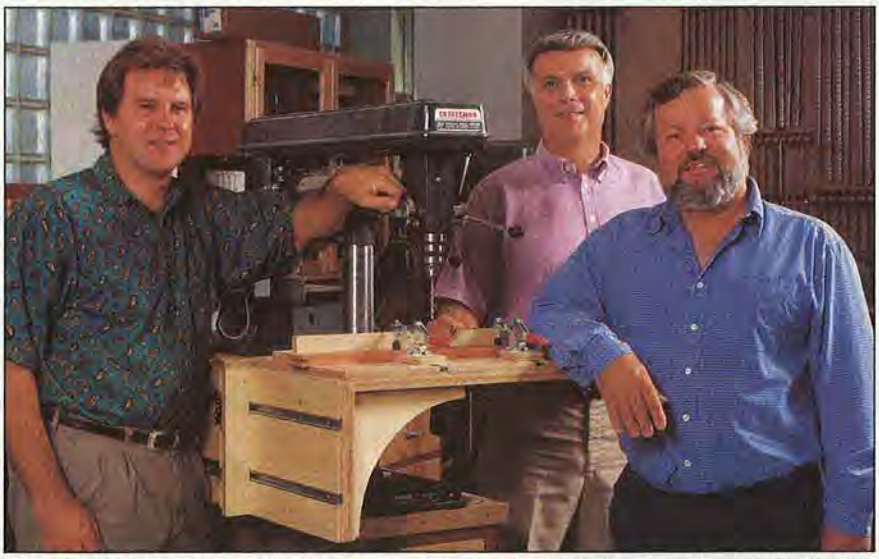
THE EDITOR'S ANGLE

WOW! The *WOOD*® magazine jig-development team has done it again



The *WOOD* magazine jig-development team (minus Jan Svec) with its latest creation: the Super-Versatile Drill-Press Jig.

It's no secret to professional woodworkers that jigs can make their life in the shop more pleasant and productive. In fact, you'd be hard-pressed to find a cabinet shop or other commercial woodworking establishment anywhere that does not depend heavily on these super-helpful devices.

While it is doubtful that your woodworking-production requirements match those of professionals, jigs and fixtures can work wonders in your shop, too. A case in point is our Super-Versatile Drill-Press Jig (see *page 38* for how to build it).

A few months ago, *WOOD* magazine's jig-development team (from left in photo: Marlen Kemmet, Chuck Hedlund, Jim Downing, and Jan Svec—not shown) set out to devise some world-class jigs for you, our readers. And I'm happy to report that they've outdone themselves with our drill-press jig.

You really owe it to yourself to consider building this marvelous shop helper. Why? For starters, it allows you to position workpieces horizontally *and* vertically because of its fully adjustable table-mounting system. (The vertical table makes it possible to do end boring.) And two toggle clamps hold your workpieces securely with little effort. Clearly, our little invention is the best jig of its type we've ever seen.

In the short time we've been using this jig in the *WOOD* magazine shop, we've fallen in love with its flexibility and accuracy. In fact, we like it so much we've decided to mount it permanently to our drill-press table.

You say it sounds perfect, but you just don't have the time to build one? We've got a solution for that, too. We've arranged to have the company that will be supplying the hardware kit for the jig also offer a ready-to-assemble kit. You can put it together in a jiffy and use it for a lifetime. Interested in placing an order? Turn to *page 40.*

Until next time, may your drill press be more useful and accurate than ever.

Larry Clayton

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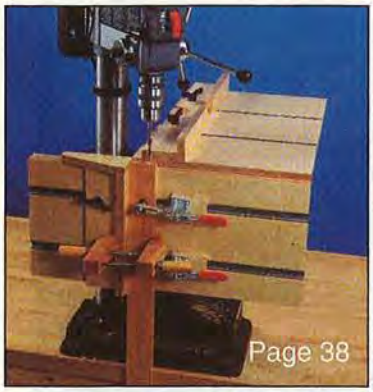
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Make way for a whole new breed of chip carver as Missourian Pam Gresham pushes the envelope of this exciting woodworking skill.

44 7 reasons to buy a home-shop shaper
Micro-adjustable fences and router-bit adaptability make these shapers a good investment.

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Yes, Virginia, real woodworkers do build kit furniture. Four of our own staff tell about their experiences with a variety of kits.

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Quite simply, the best jig of its type we've ever seen. You'll want to build it.

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We used plywood for this teen desk to keep building costs and building time at a minimum.

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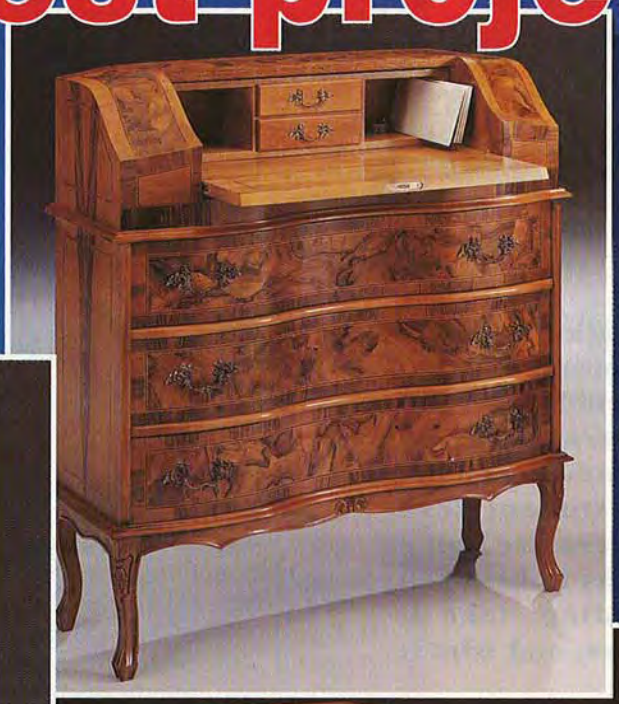
This issue's cover wood grain: pine

Your best projects



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What woodworkers need to know

The lowdown on PLASTIC T-MOLDING

Ease of application and flexibility make plastic T-molding an ideal choice for plywood projects with curved edges or rounded corners, such as our student desk *(page 52)*. Here are some hints and tricks to help you cut the molding, take it around corners, and trim it to width.

When it comes to finishing plywood edges, nothing does the job quite as easily as plastic T-molding. You just slot the edge of the wood and tap in the T-molding—so called because of its T-shaped cross-section. Fins on the molding's spline wedge it in place without fasteners or glue.

The tools for T-molding

First, you'll need some means of cutting a 5/64" slot along the edge of the wood. We found that a slot cutter chucked in a router gives the best results by far. Most router-bit suppliers list a 5/64" slot cutter in their catalogs. (See the Buying Guide on *page 57* for the source we used.)

Other tools you'll need include 3/8" and 1" wood chisels, heavy scissors or tin snips, and a nonmarring mallet.

Simple straight cuts in the spline help the molding bend into inside corners. Space them evenly along the length of the curve.

For accurate butt joints and miters, you'll need a trimming block like the one shown *below right*. Make one from a piece of scrapwood about 2×4×8".

Installing T-molding

Follow along as we run through a typical job, edging a tabletop.

Begin by routing a 5/64" slot around the tabletop's edge. Typical slot cutters form a 1/2"-deep groove, plenty deep for the molding's spline. Center the slot on the edge.

Measure around the edge to determine the length of molding you'll need, add a few inches to the result, then snip this amount from the coil. Heavy scissors or tin snips will cut the molding easily, but not very neatly. To trim the molding more precisely, grab the trimming block and a sharp 1" wood chisel. Use the block for square cuts or, as shown *above right*, 45° miter-cuts.

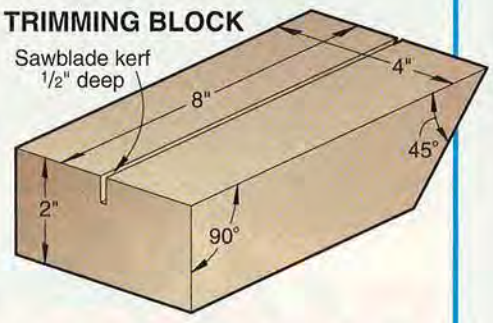
Cutting the molding

Mark the cutting point on the back of the molding's face. For the most exact fit, mark the cuts with a utility knife or scriber as you install the molding.

For a miter-cut, place the end of the molding facedown on a piece of scrapwood. Slide the trimming block's groove over the molding's spline, bringing the point on the block to the mark. Then, press down on the block and slice the molding with the chisel as shown.

Make a 90° cut the same way, using the square end of the trimming block. When cutting with the chisel and block, keep the back of the chisel firmly against the end of the block. The cutting goes more easily if you angle the chisel across the end of the molding, as shown.

Hold the back of the chisel against the end of the trimming block as you cut the molding. You'll need a sharp chisel to make neat, clean cuts.



Tap it into place

Trim the starting end square, then start installing the molding along a straight run where a joint will be least conspicuous, perhaps on the back or on an end. Press the spline into the slot. Then, feeding the molding through one hand, press it into place with the other.

Continued on page 6

Plane and simple.

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Dust hood removed for illustration.

What woodworkers need to know

The lowdown on PLASTIC T-MOLDING

Continued from page 4

Once you have pressed a short length into place by hand, hammer it in with the non-marring mallet. If you don't have one, hold scrapwood over the molding while you tap it into place with a hammer. Drive the molding straight in; don't try to stretch it along the edge by "pushing" it with the mallet.

Going around corners

T-molding bends easily around sweeping curves, but tighter turns and rounded corners call for a little chiseling. A few cuts in the molding's spline will help it negotiate turns with a radius as small as ½" .

You'll know immediately when you reach an outside curve that's too sharp. The spline will buckle and wrinkle; you won't be able to force it into the slot. The solution is simple.

Using a ⅜" chisel, cut V-shaped notches in the spline, as shown *below right*. (Using a narrow chisel prevents damage to the edges of the molding.) Then, the spline can bend sharply, as shown *below, far right*, allowing the molding to conform to the edge.

Inside curves are even easier. A few straight cuts into the spline will allow it to expand to match the curve, as shown *previous page, bottom*.

Right-angle outside corners call for a standard miter joint, as shown *below left*. Miter-cut both sides of the corner with the 45° trimming block and chisel. Generally, though, it's better to go with radiused corners. Miter-cut corners are liable to snag and pull loose.

Where one molding intersects another, cut the end of the stopped molding at a 45° angle. The angle-cut end will lie over the other molding's edge, giving a more finished appearance.

Work on around the tabletop until you return to the starting point. The loose end must meet up with the starting end to form a tight butt joint for best appearance. Mark, then trim the loose end with the trimming block and chisel. It may take some trial and error to finish the edging neatly.

Trimming the edge

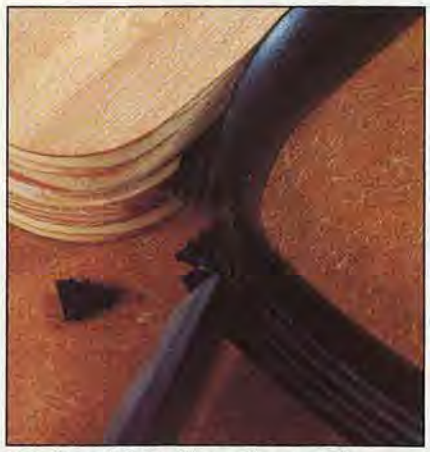
The molding measures 13/16" wide to allow for one of its common uses: edging a ¾"-thick panel with 1/16"-thick plastic laminate on one face. You'll need to shave the molding down for use on plain panels.

You can trim it easily after installation. Wrap a piece of masking tape around the end of your 1" chisel, leaving about ¼" of the cutting edge exposed at one side, as shown *below*. Shear off the excess material by sliding the chisel along the face of the panel as shown. Why not just use a narrower chisel? Because the wide blade gives broader support and results in a neat, flush edge.

With the blade taped to prevent damage to the wood, a 1" chisel neatly shears the molding edge flush with the panel face.

Photographs: John Hetherington
Illustration: Roxanne LeMoine

The molding won't bend around a 90° corner; you'll need a mitered joint. Mark the corner point carefully on the molding's back.



Cut V-notches from the molding's spline to help it bend around radiused corners. A narrow chisel prevents damage to the molding's edges.

Cut the notches in the spline all the way to the back of the molding. Make sure the wood is smoothly curved.

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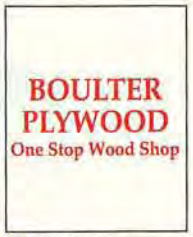

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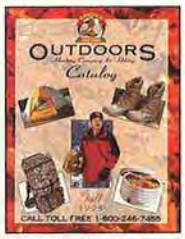

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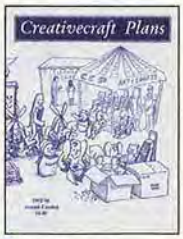

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LOCK MITER BIT

It creates a self-aligning joint that lasts and lasts.

Welcome to our newest column. As you've probably noticed by reading router-bit ads or catalogs, manufacturers offer literally hundreds of router bits in every size and shape imaginable. That's just great, but figuring out what to do with them is another matter. And that's where we can help.

Here, we give you the inside scoop on a particular router bit. We'll tell you the best applications for the bit, and share our secrets for getting the most out of it.

For future articles I invite you to drop me a line and tell me what bit you would like to see featured. Write to me at:

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Bill Krier
Assistant Managing Editor

When to use this bit

By mitering the corners of boxes and columns you can minimize the appearance of a joint line and eliminate the sight of end or edge grain altogether. However, without some form of reinforcement, such as biscuits or a spline, typical mitered joints have only fair strength, and can prove hard to align during gluing and clamping. The lock miter bit overcomes these problems by nearly doubling the gluing surface of the joint, and by cutting interlocking "fingers" that self-align the joint. (See the photo *above* of a column with contrasting woods.)

You also can use a lock miter bit to make strong, self-aligning edge joints, or to "lengthen" a board by end-joining two workpieces as shown *above*. This procedure differs just slightly from the mitering technique discussed *below*, and we cover it on *page 14*.

What you need to know about bit sizes

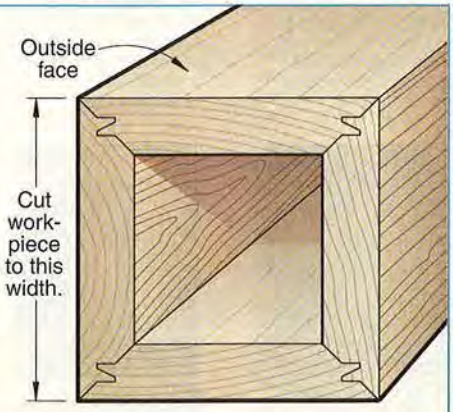
We've found lock miter bits available in two basic sizes: ¼"-shank, 2"-diameter version, and ½"-shank, 2¾"-models. We found the smaller bits work best with 7/16"-⅝"-thick materials. They require a router of at least 1 hp. The larger bits work well with materials ⅝"-1 1/16" thick. With these, use a 2-3 hp, variable-speed router or router speed control set at 10,000-12,000 rpm (test various speeds to find out which works best with your material).

How to set up the bit for miter joints

Even with the step-by-step procedures outlined here, you'll still need to make some trial-and-error test cuts to get top-quality results. So, you need to stock up on two things: scrap of the exact thickness as your workpieces, and patience.

1 Machine all of your workpieces to uniform thickness. If you're working with sheetgoods, try to make your parts from the same sheet, or from sheets produced in the same batch. Cut your workpieces to the finished width measured from the outside of one mitered corner to another as shown *right*.

Continued on page 12



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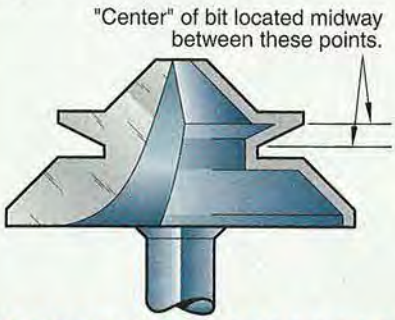
LOCK MITER BIT

Continued from page 10

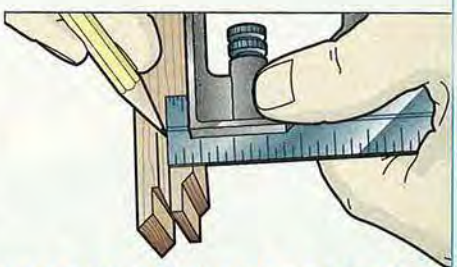
2 Secure the lock miter bit into the collet of your table-mounted router (do not attempt to use this bit in a hand-held router). Raise or lower it so it centers on the thickness of your workpiece. The drawing *below* shows you the "center" of the lock-miter bit.



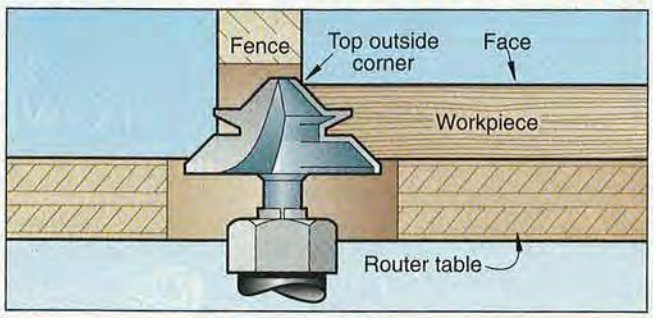
3 To double-check the height of the router bit, center your router-table fence directly above the router bit. Then, turn on the router and pass a piece of scrap stock (outside face up) through the bit.

Safety Note: *Use a large piece of scrap (at least 12" long and several inches wide). Make short test cuts into the scrap, then saw away the cut portion to preserve the large piece for more test cuts.*

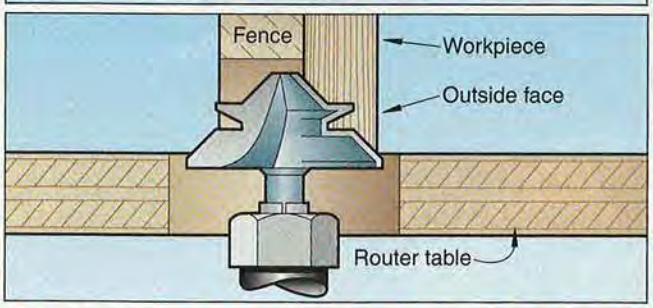
Now, place a combination square as shown *right* onto either face of the scrap piece. Adjust its blade to reach the corner in the cut produced by one of the two "center" points on bit. Tighten the blade and make a pencil mark about 1" long on the edge of the stock. Now, place the square on the other face of the scrap piece and make another pencil mark that extends toward the corner made by the other "center" point of the cut. If the second mark aligns with this corner you can be sure the cut is centered.



4 To adjust the fence precisely, lay your scrap onto the table again, with its outside face up. Bring the fence forward so that the bit will cut exactly to the top outside corner of the workpiece as shown *right.* Make as many test cuts as necessary. The top corner of the workpiece should be sharp and straight, without any reduction in the width of the outside face side.



5 With the bit and fence precisely adjusted, place your workpiece outside face up onto the table, and cut one edge. Cut the opposite edge of the workpiece by positioning the workpiece vertically against the fence, with its outside face toward you as illustrated *right.*



6 No matter how precise you are, after clamping the workpieces you may find that one of the outside edges of the miters may be off by just a hair. To solve this, use a nailset to gently roll over the overlapping edge as shown *right.* Do this after the clamps come off, but before the glue dries completely hard. Avoid excessive glue squeeze-out, and sand away any after it hardens.

Continued on page 14

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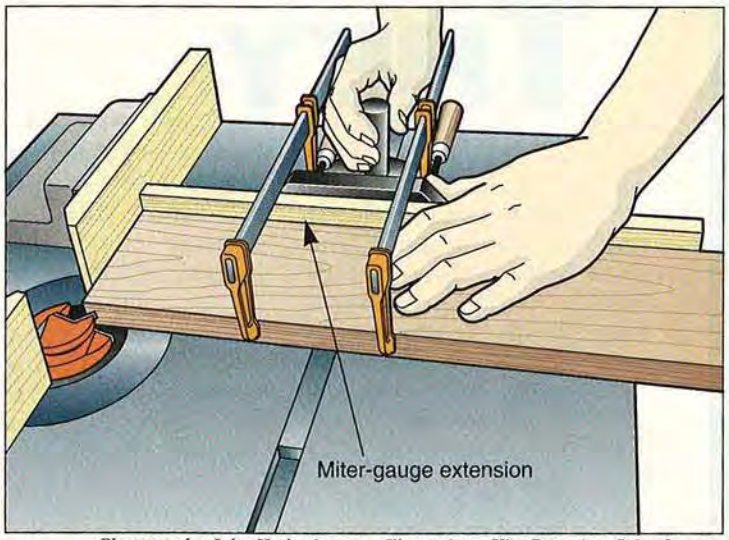
LOCK MITER BIT *Continued from page 12*

How to join edges and ends

To set up for cutting strong and self-aligning edge and end joints, follow Steps 2–4 of the previous section. To cut workpieces for an edge joint, cut one edge with the workpiece top face up on the table. Then, cut its mating edge by placing another workpiece on the table, this time with its top face down. (We mark the top face with a pencil or piece of masking tape to avoid confusion.)

You follow the same procedure for cutting ends, but here you'll need to clamp the workpiece to a miter gauge. As shown *right*, attach a miter-gauge extension to your miter gauge to support the workpiece. This helps prevent tearout on the exit end of the cut. Slowly feed the end through the router bit to avoid a choppy cut or kickback.



Photographs: John Hetherington Illustrations: Kim Downing; Brian Jensen

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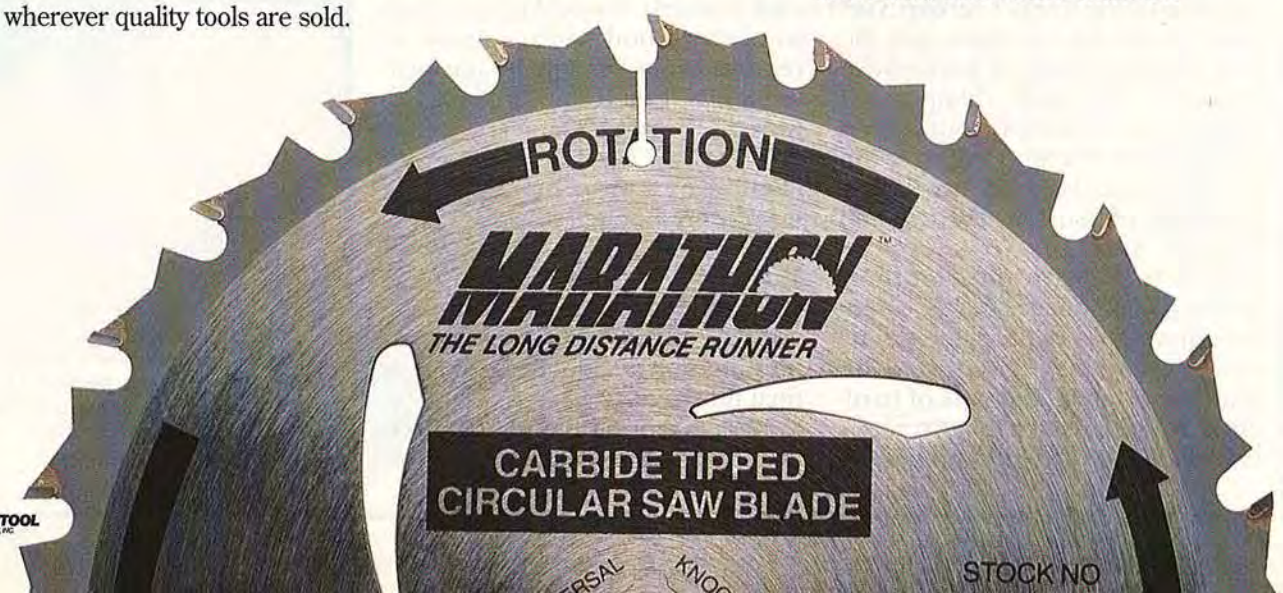

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LIGHT UP A TABLETOP WITH POLYURETHANE

IN SEARCH OF THE PERFECT FINISH

WOOD® magazine's How-To Editor shares his proven process for a super-smooth, durable finish that looks as good as the furniture you put it on.

Marlen wipes up a water spatter from the polyurethane-finished mahogany dining table that he designed and built for his home.

"Over the past 11 years, I've observed many fine woodworkers around the country, and watched as they applied finishes," says Marlen Kemmet, who, as *WOOD* magazine's How-To Editor for more than a decade, has expertly guided readers through countless projects. "Although the processes varied with the types of finish being applied, one thing was constant—patience."

Marlen has incorporated those craftsmens' tips and techniques—patience included—into the projects he turns out in his home shop. "As these woodworkers have helped me upgrade my own standards for a perfect finish, I want to share these tried-and-true practices with others," he adds.

The start of a perfect finish: gluing and clamping

According to Marlen, the actual beginning of a great finish lies in the gluing and clamping. "When edge-joining the pieces for the tabletop on my craftsman-style mahogany dining table [shown *above right*], it was extremely important to keep the top surfaces of the boards flush and the glue squeeze-out to a minimum," he notes. "For flush clamp-ups, I prefer the equal-pressure type clamps that not only tighten the pieces edge-to-edge, but apply clamping pressure to the top and bottom surfaces to keep the boards level with one another. While some squeeze-out is essential—having no excess glue points to a glue-starved joint—the removal of great amounts of hardened squeeze-out with a scraper can also take off wood fibers and damage the surface. So, you have to minimize squeeze-out, then scrape it off carefully."

For surface preparation, light up the high spots

After removing the clamps, then the squeeze-out, Marlen checks the surface of the workpiece with the edge of a carpenter's square or straightedge. He holds a bright light (such as his favored halogen utility light) just slightly above the wood surface at one end of the workpiece to clearly see any high spots. They show up between gaps under the straightedge. Marlen next marks the high spots with a pencil, then belt-sands the penciled areas with 80-grit abrasive. "I may have to check and recheck a surface a dozen times until I get the surface perfectly flat," he says.

Switching to an orbital sander and 100-grit discs, Marlen goes over the wood surface again to remove scratches left by the belt-sander. "I'll sand the surface a bit, turn off the sander, and spend several minutes carefully looking for remaining scratches, which I mark with a pencil for more sanding [as shown *right*]," he explains. "I never skip the pencil marking. It's too easy to miss a sanding scratch, which really won't show up until you've added the stain or final finish."

Marlen repeats the pencil marking/sanding procedure with 150-, then 220-grit sandpaper. For the edges, though, he switches sanders. "An orbital sander works great for flat surfaces, but I don't recommend it for routed edges because it's too hard to control. For this, I like a palm sander."

The foundation of a perfect finish is the sanding. With a pencil, Marlen marks sanding scratches to be removed.

Continued on page 18

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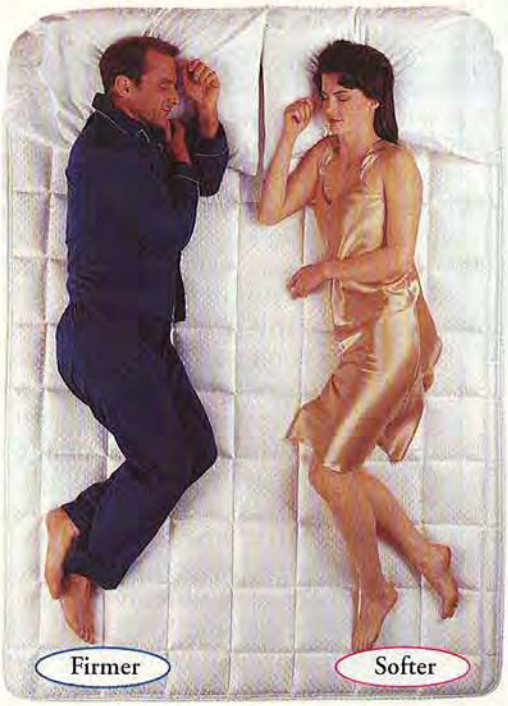

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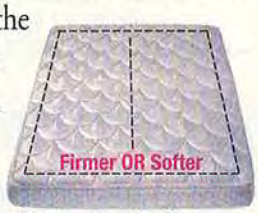

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LIGHT UP A TABLETOP WITH POLYURETHANE

IN SEARCH OF THE PERFECT FINISH

Continued from page 16

After he has sanded the surface to perfection, Marlen cleans it with compressed air and wipes the wood down with a tack cloth. "Compressed air works great for cleaning dust from pores that a tack cloth can't get," he says.

Careful application for a lasting finish

With four youngsters and frequent family gatherings, a tabletop in Marlen's home sees plenty of hard use. That's the main reason he chose a clear polyurethane finish. "You can't beat a polyurethane for durability," he comments. "And I've always had great success in the past with Minwax Fast-Drying Polyurethane."

Marlen starts the finishing by lightly wiping down the workpiece with a cloth dampened in thinner to clean it. With a foam brush, he next applies one coat of gloss polyurethane. As with the sanding, Marlen uses a halogen utility light to shine on the wood at a level just slightly above it (see photo *below*) to spot any areas still needing finish. "After brushing the surface and adjoining edges, run the brush along the bottom outside edge to remove any possible drips," he says. "Later, after the first coat has completely dried, I use 0000 steel wool or Scotch-Brite pads to smooth it. If any edge drips occur, use a piece of wood to scrape off the drip, just like with the squeeze-out. Then, steel-wool the scraped area."

Marlen makes sure that he removes all remaining steel-wool particles with a tack cloth. Then he repeats the finishing process with another coat of gloss followed by two or more coats of satin polyurethane. But it's his finishing touch that adds the ultra-smooth, mirrorlike surface. "After allowing the final coat of polyurethane to dry, I put a buffing head on my orbital sander and apply a liberal amount of 3M Finesse-it II Finishing Material [available at automotive paint dealers] to the tabletop and start polishing," he says. "It evens everything out, and is the payoff for the patience."

Written by Peter J. Stephano with Marlen Kemmet
Photographs: Wm. Hopkins Assoc.

Aided by a low-level light, Marlen applies the polyurethane with a foam brush.

A final buffing with liquid polishing compound evens out the polyurethane.

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TIPS FROM YOUR SHOP (AND OURS)

Our top-tip prize winner Jerry Boone, *right,* discusses his miter-gauge jig with John Freeland, president of the Kansas City Woodworkers' Guild.

Shop tips come to us from all over the globe. But last summer, we went looking for the tips. We got in touch with representatives of the Kansas City Woodworkers' Guild and asked them send us their best ideas. We included two of their tips in this edition of *TIPS FROM YOUR SHOP (AND OURS)* and rounded up some ideas for future projects from these folks as well.

If your club would like to be featured, drop us a line. From time to time, we plan to highlight tips from clubs across the U. S. and Canada.

That doesn't mean, however, that we aren't still looking for shop tips from the rest of you. If we publish your idea, we'll pay you $40, plus you'll get a shot at winning the top tip tool prize. Send your ideas to:

Tips From Your Shop
(and Ours)
***WOOD*® Magazine**
1912 Grand Ave.
Des Moines, IA 50309-3379

We try to publish original shop tips, so please send your idea to only one magazine. Also note that we cannot return your submissions. Thanks, and keep 'em coming.

Tom Jackson
General-Interest Editor

This adjustable miter-gauge fence doesn't wear out

TOP SHOP TIP

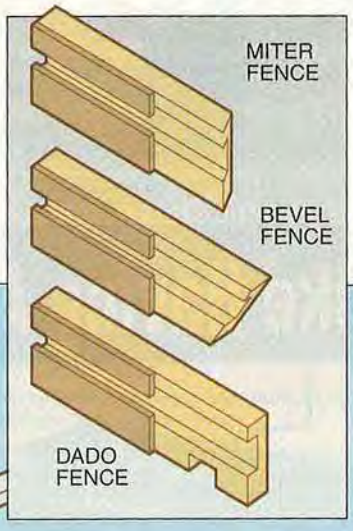
Most auxiliary fences that bolt to a miter gauge eventually start to look pretty ragged. If you use one for mitering, beveling, dadoing, and such you eventually wind up with big chunks missing.

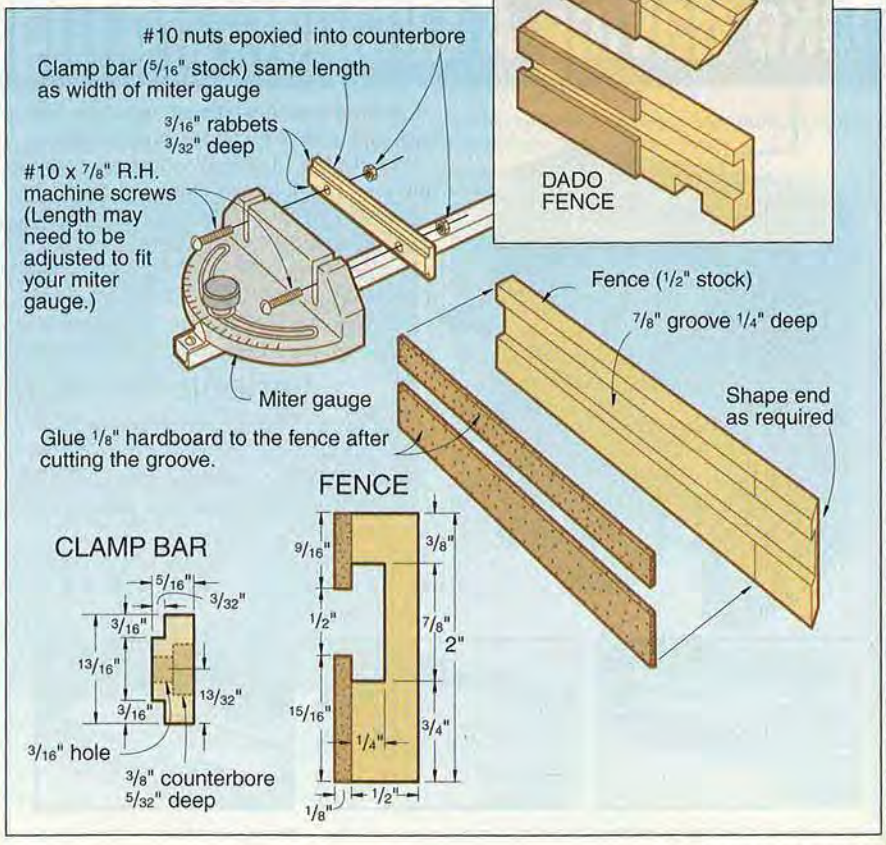
This adjustable fence, though, slides toward or away from the blade so that you never cut the face—regardless of the blade or the angle of the cut. You also can fabricate different slides for zero-clearance cuts.

To build any of these three fences, cut the fence and clamp bar to the dimensions shown. For length, use whatever dimension suits your needs. Choose maple or another smooth, stable hardwood. Then, glue the two pieces of hardboard to the fence. Now, use epoxy to secure two #10 nuts in the clamp bar. Attach the clamp bar to your miter gauge. Slide the fence on the clamp bar and position it. Finally, secure the fence by tightening the screws.

—Jerry Boone, Kansas City Woodworkers' Guild

For submitting the top tip in this issue, Jerry Boone receives a Freud Five-Piece Cabinet and Molding Bit Set. Way to go Jerry!





Continued on page 24

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550	Pocket Cutter Kit w/steel case	$179.
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1555	DW625	3 HP V/S Plunge Router	$274.
1425	DW675K	3 1/8" Planer w/case	$159.
1264	DW682K	Biscuit Joiner Kit	$219.
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*Better Homes and Gardens® WOOD® Magazine (Nov. '95)

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TIPS FROM YOUR SHOP (AND OURS)

Continued from page 20

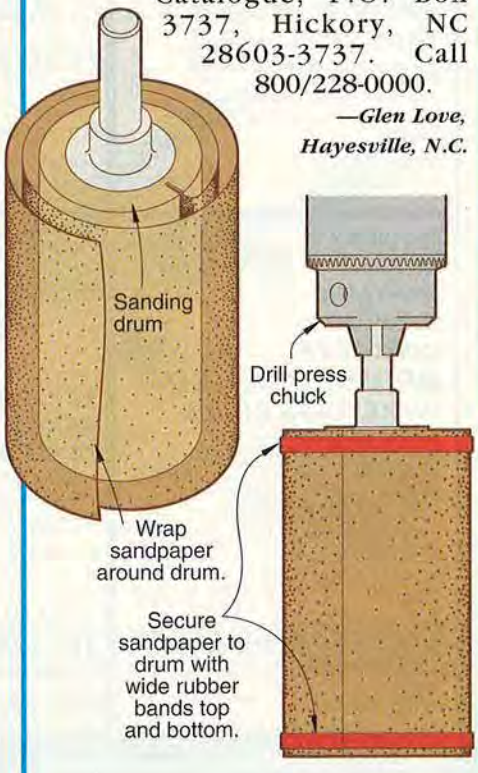
Wrap a roll of sandpaper around your drums

On a drill-press sanding drum, the sandpaper often wears smooth or glazes over quickly. And changing the paper on these drums eats up a lot of time.

To increase your productivity when using this tool, try wrapping a long length of adhesive-backed sandpaper to the drum. Wind the sandpaper so the edge rotates away from the workpiece, not into it. Secure the sandpaper to the top and bottom of the drum with rubber bands. When the abrasive on the top layer wears out, simply slip off the rubber bands, cut off the worn section, put the rubber bands back on, and resume sanding.

You can improve the convenience of this technique by stocking your drum with sandpaper from a roll. These 4½"-wide rolls normally are used for ¼-sheet finishing sanders, but they come in lengths up to 25 yards. If you don't find these rolls in your local store, contact Klingspor's Sanding Catalogue, P.O. Box 3737, Hickory, NC 28603-3737. Call 800/228-0000.

—Glen Love, Hayesville, N.C.


Sanding drum
Drill press chuck
Wrap sandpaper around drum.
Secure sandpaper to drum with wide rubber bands top and bottom.

Continued on page 26

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Over 15 years ago Biesemeyer introduced new saw fence technology that has won awards and legions of fans as it changed the way a tablesaw is used. The built-in tape and hairline pointer easily enable you to make precision setups quickly and consistently. And unlike other saw fence systems that count on a rear lock to crutch a weak front lock, the strength of the locking mechanism on the T-Square® saw fence allows precisely square cuts time after time.

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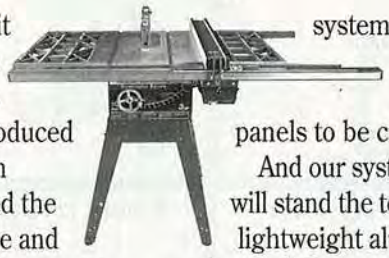

systems offer up to 52" to the right of the blade and 48" to the left, allowing even 4'x8' panels to be cut with ease.

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Circle No. 15

TIPS FROM YOUR SHOP (AND OURS)

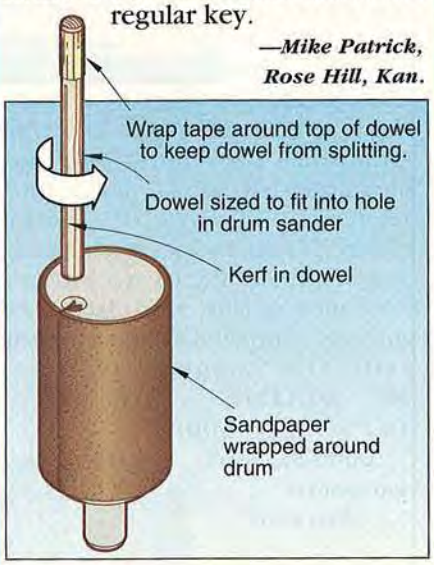
Continued from page 24

Dowel rod "key" pulls sandpaper tight on drums

If you have trouble getting the sandpaper tight on your sleeveless sanding drums, try this trick. Find a dowel that matches the diameter of the hole that you tuck the sandpaper into. Cut this dowel 2" longer than the length of the drum, and then cut a kerf down the middle with a bandsaw. Stop the cut 2" short of the dowel end.

Now, trim and install the paper on the drum. Insert the dowel by sliding the kerf over the ends of the sandpaper, and twist the top of the dowel to tighten the paper. Remove the dowel and insert the regular key.

—Mike Patrick, Rose Hill, Kan.


Wrap tape around top of dowel to keep dowel from splitting.
Dowel sized to fit into hole in drum sander
Kerf in dowel
Sandpaper wrapped around drum

A FEW MORE TIPS FROM OUR WOODWORKING PROS

- Looking for a quick way to bore tapered holes for candles? The candlestick turning project on *page 58* shows you how to modify a spade bit to take care of the job in short order.
- If you need a slip-free miter joint, the Router Workshop on *page 10* shows you how.
- You can adapt our inlaid flamingo design on *page 50* to ornament other projects. Enlarged, it would look great in the center of a serving tray.

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(By Frank K. Wood)

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- Summer garden helpers, lawn deco art.
- Picture-perfect frames, country carousel on a stand.
- Bunnies for Easter, rabbits to hang on the wall.
- Angels of love, Christmas and song.
- And much, much more.

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TALKING BACK

We welcome comments, criticisms, suggestions, and even compliments. Send your correspondence to: Talking Back, *Better Homes and Gardens*® *WOOD*® Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379. To contact us via computer, use these on-line addresses:
***CompuServe*: 74404,3516**
***Internet*: 74404.3516@compuserve.com**

Once was not enough!

I was looking at the "Federal-Style Mirror" in the April 1995 issue when my wife came up with this variation. I followed the basic idea of your design when building this window-style mirror that we placed over the fireplace.

However, I replaced the dowels with biscuits. The stiles and rails are routed to receive separate mirrors in each of the three openings. The mirrors are held in these recesses with hardboard fastened with large washers and screws.

—Mike Taylor, Sunnyvale, Calif.

Manufacturers respond to air-filtration article

We have heard from several manufacturers in response to the article "Air-Filtration Systems, Another Weapon in the Battle Against Workshop Dust" in our November 1995 issue.

From D. Wayne Preston of Total Shop: "On page 50 you really get into detail about the time and trouble it is to change filters on the Total Shop unit. Maybe you could have explained that the filter changes take an extra 5 minutes. You also state in your facts that the T/S unit weighs 40 lbs. One of our big selling points is that our unit is heavier than the others (55 lbs)."

From Ed Levy of Penn State Industries: "The louvered design of the AC460 unit enhances its performance over the competition significantly. An air-cleaning system should be designed to capture dust from ALL parts of a shop. This is only possible with a unit that propels the air as far as possible, creating a circular airstream."

Editor's Note: Ed also wants readers to know that beginning in November 1995 he began using upgraded filters, and added weather stripping around the filters. We plan to reevaluate any improved air-filtration systems in a future "Tool Buyer's Update."

From Blaine Miller of Hartville Tool: "My unit has the exact same motor as the one found in the other units, and all of the motors and blowers require lubrication."

Editor's Note: The Hartville unit we tested had a Fasco motor on it, but Blaine says his units now feature a Dayton motor/blower assembly. Blaine also correctly pointed out that all of the units in the test have motors that require lubricating oil.

Whoa, router!

I am building raised-panel doors for a cabinet, and after reading "Eight Sure-Fire Ways to Make the Most of Your Router" in the January 1993 issue of your magazine, I decided to go with cope-and-stick joinery. I then purchased a reversible rail-and-stile router-bit set for cutting these joints.

I had no problem in shaping the edges of the stiles. However, when I started cutting the end-grain joints on the rails, the wood burned badly and filled my shop with smoke! I made the cuts in small increments as recommended by the manufacturer, but this made no difference. Can you help me solve this problem?

—John W. Jamison, Langhorne Manor, Pa.

John, cutting or shaping with dull cutters, or at too high a cutter-bit speed may cause wood to burn as you described. Because your bits were new, and presumably sharp, we suspect that the problem lies in your router speed setting.

We have few problems with burning when we slow our rail-and-stile router bits to the 8,000 to 10,000 rpm range. Many wood shapers operate in this speed range, so if you have a shaper that can take router bits, use it for making these cuts. Otherwise, slow the motor speed of your router. If your router doesn't have built-in electronic variable-speed control, you can plug your router into a motor speed control designed for universal motors. We found one of these controls, rated at 15 amps, item #9000, at a price of $34.95 in the catalog from MLCS Ltd., P.O. Box 4053 C-18, Rydal, PA 19046. Call 800/533-9298.

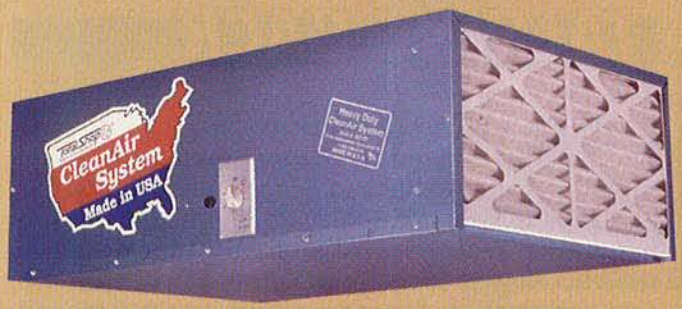
A bit thicker in the middle, please

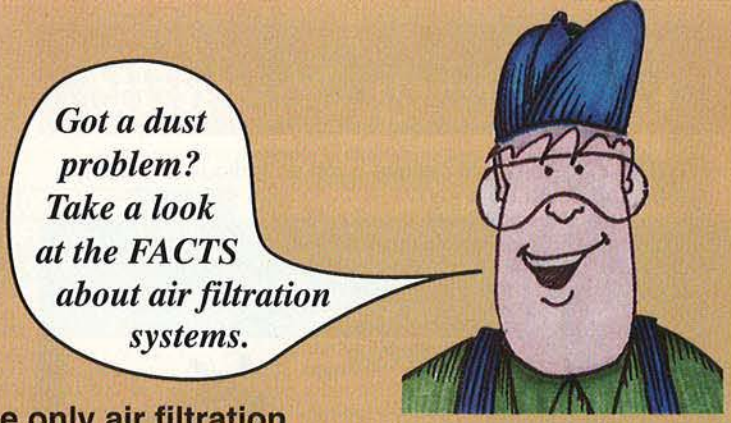
In the article "The Tanglewood Fireball" in the August 1995 issue, there is the statement "Strive to make the strands a constant diameter (about 5/64" is good)." Unless I'm mistaken, that's only a bit larger than 1/16", and almost impossible to work without breakage. Shouldn't the size of these strands be larger?

—Fred Henningsen, Missoula, Mont.

You're right, Fred. The diameter of these strands should be 5/32".

Continued on page 30





Fact #1 Total Shop's *CleanAir System* is the only air filtration system with an air tight fan box. We caulk our filters in place for a totally air tight seal. No dust can slip by the filters creating a fire hazard in the motor. On other units, a potential fire hazard does exist.

Fact #2 With the Total Shop *CleanAir System* you will spend less time changing filters. Our 15" thick filter has been proven to last in hobby shops for an average of 12 - 14 months. Considering filter size, the JDS Air Tech 2000 unit would last only 6 - 7 months with their 8" filter and the Hartville Tool unit would last only 3 months between filter changes with their 4" filter.

Fact #3 The Total Shop *CleanAir System* is the only filter unit in this price range that has been UL Tested and Approved. Our main filter is the only filter approved and labeled by ASHRAE as 95% effective on wood dust. A recent magazine article featured the JDS unit and revealed the Air Tech 2000 has only 65% efficient filters.

Fact #4 Total Shop's *CleanAir Systems* have been made in Greenville, SC for almost 9 years. No competitor has been advertised for more than 2 1/2 years.

Fact #5 The Total Shop *CleanAir System* is the only filtration unit that includes a lifetime warranty. Any defect in workmanship will be repaired FREE for as long as you own the unit. No competitor currently offers this!

Fact #6 Experience and customer satisfaction are #1 at Total Shop. All competitors combined have less units in use than Total Shop. We are so sure of our *CleanAir System* that we give you a 30 day trial period. If you aren't satisfied just send it back for a refund.

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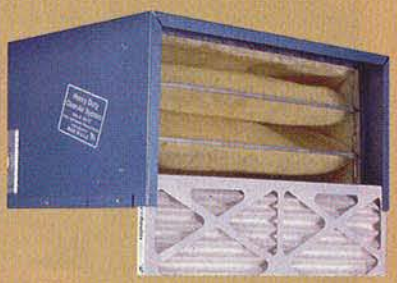
- Very quiet operation
- Has no effect on existing room temperature
- Runs on standard house current
- Compact size fits almost anywhere
- Heavy gauge steel cabinet w/ mounting holes



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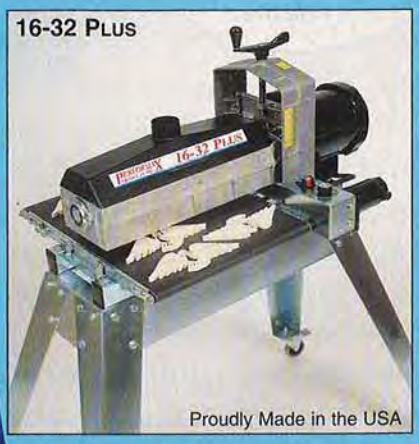

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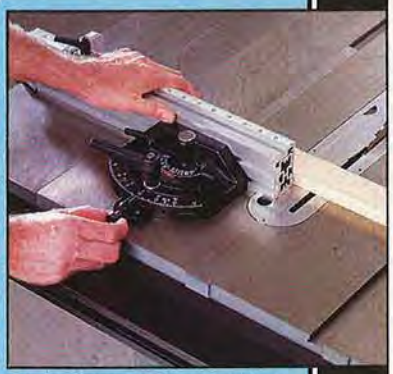

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TALKING BACK

Continued from page 28

Eagle America correction

The price we listed in our review of the Eagle America Router Table and Fence Package, page 47 of the January 1996 issue, does not include the hold-down featherboard and stop block for the fence as shown in the photo. These two items are sold separately as accessories and cost $10.99 and $9.99 respectively. Also, the metal table legs shown in the photo are not an Eagle America product. The company sells a hardwood table-leg assembly for $129.99.

One good spoon deserves another

When I saw Fern Weber's "Sweetheart Spoon" in the January 1995 issue, I knew I had to add it to the collection of wooden spoons I carve. I made the first spoon for my wife in mid-April, and it took me 12 hours to carve it. By June 1st, I had carved 12 of them, and my carving time was down to 6 hours per spoon.

I did make a couple of changes from the original plans. First, I altered the shape of the bowl to balance the carving on the other end of the spoon.

And second, rather than carve the six small dots in the center of the flower, I drilled holes sized to fit round toothpicks to within ⅛" of the bottom of the carving. When the flower carving was complete, I glued in the toothpicks, leaving about 1/16" protruding above the surface. I rounded off these ends with sandpaper for a finished appearance.

—Doug Rasmussen, Lansing, Mich.

Missing In Action

The *WOOD PATTERNS*™ insert that was included in the November 1995 issue of *WOOD* magazine is missing the full-sized patterns for the top front rail (D) and the bottom back rail (E) for the "Forever Country Plate Rack." If you're building this project, please send us a self-addressed business-sized envelope, and we'll send you the patterns. Our apologies for the inconvenience.

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Sale prices good thru 2/28/96.

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New specs, 5° Neg. Pts. & flat, runs out less than .002 for perfect, tight, smooth, splinter-free miter joints. **TAKE EXTRA 10% – 20% OFF COMBO SALE!**

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Sears 8-1/4" & Delta 8-1/4"x60Tx5/8"	$170	$ 99
Hitachi 8-1/2"x60Tx5/8"	$179	$109
DeWalt 8-1/2" & Ryobi 8-1/2"x60Tx5/8"	$179	$109
Delta 9"x80Tx5/8"	$204	$119
Ryobi–Makita & all 10"x80Tx5/8"	$207	$129
DeWalt, Makita, B&D, Hitachi 12"x80Tx1"	$229	$139
Ryobi–Makita 14"x100Tx1"	$266	$179
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For good general purpose cuts use Woodworker II 30T & 40T or Woodworker I. Use small stiffener where possible.

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With this one ALL PURPOSE blade you can RIP & CROSSCUT 1"–2" ROCKHARDS and SOFTWOODS resulting in a **SMOOTH AS SANDED** surface. PLY-VENEERS of OAK and BIRCH will crosscut with NO BOTTOM SPLINTER at moderate feed rates.

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- **BUY AND SHARPEN 1 BLADE INSTEAD OF 3**

5/8" holes, boring thru 1-1/4" add $7.50. Larger at Time Basis —Shipping $4.50

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14"X40TX1"	$215	$149	$134	$119
14"X30TX1"	$195	$139	$125	$111
12"X40TX1"	$183	$129	$116	$103
12"X30TX1"	$162	$119	$107	$ 95
10"X40TX1/8" or 3/32"	$156	$119	$107	$ 95
30T 1/8" or 3/32"	$135	$ 99	$ 89	$ 79
9"X40T	$146	$109	$ 98	$ 87
30T	$125	$ 99	$ 89	$ 79
*8-1/4"X40TX 3/32"	$136	$ 99	$ 89	$ 79
8"X40T 3/32"	$136	$ 99	$ 89	$ 79
30T	$115	$ 89	$ 80	$ 71
7-1/4"X30T 3/32"	$112	$ 69	$ 62	$ 55
**6"x40T 3/32"	$136	$ 89	$ 80	$ 71

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WOODWORKER I – For TABLE and RADIAL SAW

This trim and crosscut ALL PURPOSE blade gives scratch-free polished cuts on all materials RIP or CROSSCUT UP TO 2".

- ALL 60T AND 3/32" THIN KERF 30° ATB and 5° face hook on 10" diameter and under. 12" and 14" are 20° ATB 1/8"K.
- DOUBLE HARDER and 40% STRONGER carbide.
- THIN KERF: Saves 1/3 wood loss on each cut, radial or table. Feeds easy when used for moderate rip and crosscut on table saw. Reduces "JUMP IN" for better "PULL CONTROL." Practically eliminates bottom splinter on RADIAL CROSSCUT.
- Totally stops ALL bottom and top splinter on ply veneers in push-cut mode on RADIAL.
- Our STIFFENER STRONGLY RECOMMENDED AGAINST outside blade for best cuts. Made and serviced in U.S.A. for your benefit.

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10"x60Tx5/8" 3/32"K	$162	$129
9"x60Tx5/8" 3/32"K	$156	$119
8"x60Tx5/8" 3/32"K	$150	$109
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8-1/4"x60Tx5/8" 3/32"K	$150	$109
7-1/4"x60Tx5/8" 3/32"K	$150	$109

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Outperformed 36 other premium blades, both foreign and domestic! WOOD® Magazine test, Sept. '93, pg. 45

TRY A FORREST CARBIDE BLADE TODAY!

The Proof Is In the Cutting

Both Woodworker II blades performed very well, whether cutting through butter-soft ¾"-thick pine or iron-hard 1¾"-thick ash. The 20° positive hook angle and 15° alternate top bevels give the blades an aggressive attack; we maintained a brisk, uniform feed rate while ripping a variety of woods on the powerful Unisaw and experienced no discernible resistance or slowing. On the smaller saws, switching to the thin-kerf blade allowed very similiar feed rates, again with barely noticeable resistance.

Although we've used blades that cut faster, their cut quality couldn't touch what we got with the Forrest blades. On solid stock, ripped edges came off our saws jointer-finished, smooth and slick with no visible teeth marks—good enough to edge-glue without additional machining. Crosscuts came out crisp and clean with no fuzzing or tiny splintering.

The Bottom Line

Performance of the Woodworker II is impressive enough that you could bolt this versatile, general-purpose blade on your saw and use it for virtually all of your cutting operations.

SHOP TEST, Woodworker's Journal Nov./Dec. '95 pg.78

NEW DELUXE DADO-KING!

C-4 Carbide Tips — 4 on each chipper with special negative face hooks.

	LIST	SALE	10%	15%
6" D. 5/8" Bore **NEW**	$299	$269	$242	$229
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12" D. 1" Bore	$499	$449	$404	$382

(Bore up to 1-1/4" Add $25 — Plus $5.50 S&H)

DURALINE HI-A/T FOR TABLE & RADIAL SAWS ALL FLAT FACE

5/8" HOLES. Boring up to 1-1/4" $7.50 extra. Larger holes–time basis. Shipping $4.50.

Faster feed rates & absolute splinter control. Stops splintering on OAK/BIRCH PLY VENEERS & MELAMINE.

SIZES AVAILABLE	LIST	SALE	SIZES AVAILABLE	LIST	SALE
7-1/4"x60Tx3/32" K	$149	$129	12"x100Tx1-1/8"K	$253	$215
8"x80Tx1/8" & 3/32" K	$202	$169	14"x80Tx1"	$232	$197
9"x80Tx1/8" & 3/32" K	$207	$179	14"x100Tx1"	$266	$226
10"x80Tx1/8" & 3/32" K	$207	$159	16"x80Tx1"	$262	$223
12"x80Tx1-1/8"K	$212	$181	16"x100Tx1"	$294	$243

Above 1" bore standard.

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CARBIDE IS THE HARDEST OF THE C-4 GRADES AND 40% STRONGER, NOT WEAKER!

FOR 50% TO 300% LONGER LIFE.

Standard C-2 Carbide (below, left) and FORREST **still sharp** Oxidation and Corrosion Resistant Sub-Micron C-4 Carbide (below, right). Each shown after cutting 3,500 feet of MDF. Similar results obtained cutting particle board, melamine, and plywood.

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5"	$24
6"	$25

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REDUCES NOISE 50%–75%

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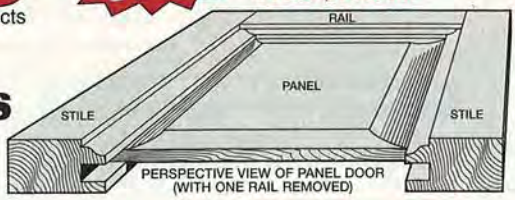

PERSPECTIVE VIEW OF PANEL DOOR (WITH ONE RAIL REMOVED)

SIZE & FORM	ITEM #	PRICE/SET
1/4" Shank Router	#1301	$69.95
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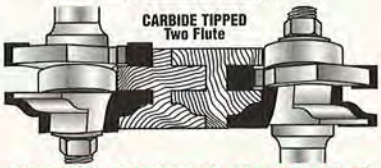
RAISED PANEL ROUTER BIT
*2" Large Diameter (1/4" Shank)
*3-1/2" Large Diameter (1/2" Shank)
4-5/8" Large Diameter (Shaper)



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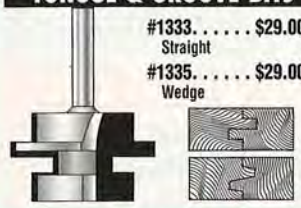
#1370. . . . . $17.00 (1/2" Radius)

TONGUE & GROOVE BITS

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#1335. . . . . $29.00 Wedge

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SHE CHIPS AWAY AT TRADITIONS

Missouri chip carver Pam Gresham takes Old-World techniques in bold new directions

Peasants in Old-World Europe and Scandinavia couldn't afford the elegantly adorned household trappings enjoyed by the merchants and aristocracy. Yet, they wanted to enjoy a similar beauty and brighten their everyday lives. They accomplished this by decorating common wooden items—platters, bowls, boxes, trunks, furniture, even tools—with intricately carved patterns done with a simple knife. Many such designs were spontaneous, with very little rhyme and less reason. Others carried personal and cultural meaning. A rosette, for instance, was a symbol of charity. A pair of birds facing each other represented a happy marriage.

Branson, Missouri, chip carver Pam Gresham knows the meaning of Old-World symbols, and many from the New World as well. She's spent years researching them because when she picks up her knife to endow a piece with one, it's to carry on tradition. Pam finds satisfaction in that.

"I have always tried to keep my work functional. That is the history of chip carving—it was always done on functional things. Folks just picked up a knife and did their own thing for their home," comments the fair-haired carver. "And I probably do nearly 50 of the smaller, functional-type items." (See some of the 2,000 carved products she makes annually on the following pages.)

***Left*: Pam Gresham's chip carving knows no bounds. Behind her is a screen with a Pennsylvania Dutch motif. The oak bar has basswood panels carved with Old-World designs. Other items on display feature carved Southwest patterns and Ozark dogwood blossoms.**

Continued

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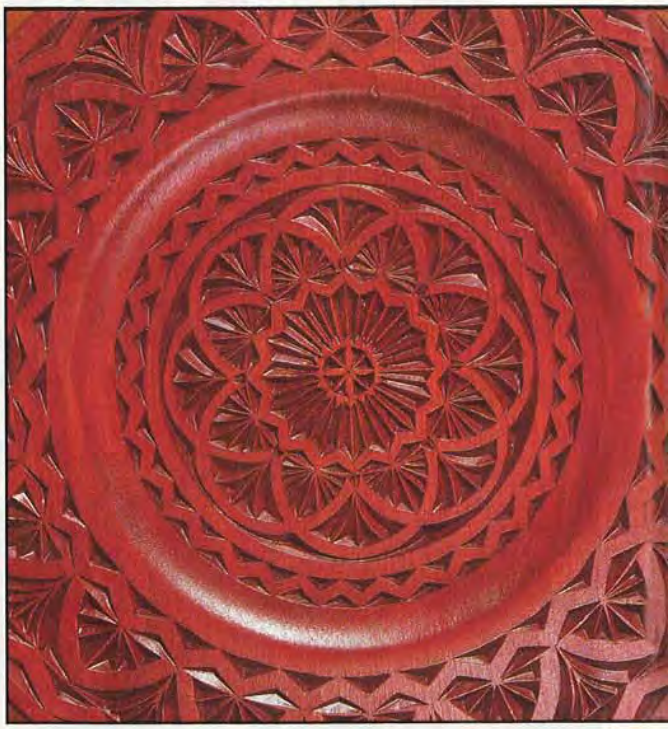
SHE CHIPS AWAY AT TRADITIONS



Above: **An intricate pattern like the one on this plate requires only one tool, a Swiss-style chip-carving knife, and plenty of patience. The colored stain is coated with a clear-oil finish.**

Left: **Pete, Pam's husband and also a professional carver, prefers the relief style shown on the headboard behind him. He does practically all the woodworking for Pam's line of chip-carved items.**

Talk about pride in precision!

Pam has won several national-level blue ribbons for her chip carving. She credits it all to her love of precision.

"I'm happiest when I'm sitting here at my worktable measuring [designs] in centimeters," Pam says. "When the piece is finished, I can see where my time went. When I was studying music, I could practice and practice and practice, then once the piece was played, it was gone. With chip carving, you've got a tangible product to be proud of."

One look at her work will convince you of Pam's sincerity. Her pieces leave nothing to guesswork. "Yes, I measure," says Pam, a toss of her head clearing her hair from her shoulders, "even if the cuts look freeflowing. I could get by without being so specific, but I don't want to just get by. When someone hangs one of my pieces, I want to know that it's right. It's my advertising. So, if I know it has a flaw, it goes in the fireplace. I can actually see something that's a sixteenth of an inch off—it's glaring. I want to know that all my carving is precise." She looks up and laughs. "But when it comes to cooking and laundry, that's another story."

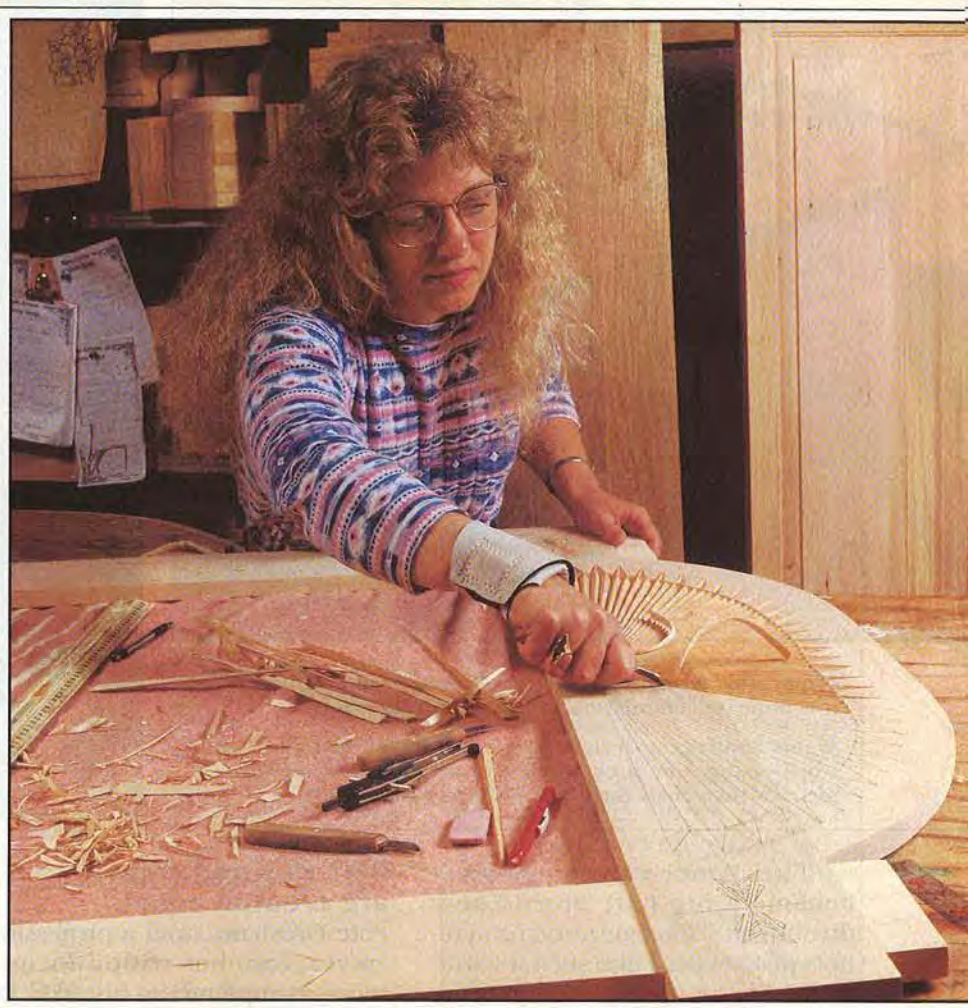
Cut, cut, then toss it out

Pam's interest in chip carving goes back a dozen years. She and Pete lived in Alton, Illinois, and regularly attended the meetings of a local woodcarving club. Pete was the carver, on a hobby level.

"I had watched a couple women members of Pete's club do chip carving. One of them suggested that I take a class," recalls Pam. "I ended up taking a weekend seminar with Wayne Barton [a master chip carver who first brought the style to the public's attention] in St. Louis. That was in 1984.

"My son was a baby then," she continues, "and I thought that chip carving was something I could do at home without making a great big mess. After all, I only had to keep track of one tool."

Now, 12 years later, as Pam deftly slices into the basswood napkin holder before her, an obvious question develops: How did you get so good after only one carving class? "I practiced a lot," she nearly giggles in reply. "You see, I studied music in college, so I knew that you must practice tech-



Above: **Only established patterns from Pam's extensive file get traced onto the wood. New patterns she first works out right on the wood.**

Right: **To prevent injury, Pam wears a wrist support while carving. She also exercises with weights to tone her muscles—the long cuts on the Southwest mirror won't be marred by weakness.**

niques, like the scales, over and over. I was a real technical musician, so naturally, I approached chip carving like I did musical scales. I learned the technical part of it, cut after cut after cut. Then, I'd throw away what I had carved. I didn't try to finish any pieces then; I just practiced the cuts. That's how I teach even now. It's kind of like studying English—you learn all the rules, then learn when you can break them."

Watching Pam work, chip carving appears simple. A short deep cut here. Then another at an angle to the first. A third slice pops up the triangle-shaped piece of wood. What's to it, anyway? Pam offers some insight to the skill.

"You can tell good chip carving from bad by the number of pieces accidentally chipped out—the less the better," she says. "Good chip carving also has a smoothness to the cuts, an evenness of depth in every cut, and the same degree of angle in which the knife entered the wood. You know," Pam almost sighs, "anybody can do something once, but it's the ability to repeat the same cuts time after time with the same quality that makes a good chip carver."

Too, you must know when to quit. "The difference between a novice and a professional chip carver is knowing when to stop cleaning up a carving," Pam notes. "You have to stop picking at it."

Chipping away at cultures

To most of us, Branson, Missouri, probably stirs up more images of guitars, cowboy boots, and country music than Old-World chip-carving motifs. Nonetheless, Pam finds Branson's show-biz atmosphere a creatively stimulating one.

"This country is a mesh of many diverse cultures, and I'm reminded of that here," Pam observes. "American art reflects that mesh, too, no matter the medium. And I can see chip carving evolving into patterns drawn from the traditional designs of various cultures."

Pam already has started the evolution. She says: "I carved traditional, Old-World designs for quite awhile. But I'd often see things that lent themselves to chip carving. Then a few years ago, a friend who had lived in Holland asked me to carve three cookie molds. Each of the designs he gave me had a special meaning in that culture. That's what really got me motivated to do other things."

Continued

SHE CHIPS AWAY AT TRADITIONS

Above: **This trunk-style Southwest coffee table in basswood was done on commission for a Kansas City couple.**

Right: **Southwest designs posed a new element to Pam's work—paint. She uses acrylics to brighten the carved geometrics, then coats the piece with clear Danish oil.**

The American Southwest became a big part of this new direction. "The geometric symbols just seemed like such a natural thing for chip carving," she comments. "Pete said, 'Try it.' And because he has a better eye for design than I do, I did. Now, my Southwest carvings are more popular than I ever imagined."

On trips to the East, Pam also had noticed the patterned motifs created by the Pennsylvania Dutch on barns and homes. She was fascinated by their possibilities, and began adapting them to her chip carving, too.

Regarding the symbols from other cultures, the carver makes it quite clear that what she does is borrow them. "I try to make all my composite designs original. But that sometimes means taking an element from one source and combining it with one from another. To me, I'm still carrying on the chip-carving tradition, doing what others before me would have done."

Not all wood chips are created equal

Pete Gresham, now a professional carver, too, but with a focus on relief, complements his wife Pam perfectly. He not only supplies the woodworking skills that create projects for her to chip carve, but he knows his wood.

"I couldn't carve without Pete's help," Pam explains. "He knows everything." For instance, Pam and Pete don't even consider carving oak and walnut ("Unless a customer has really deep pockets," says Pete). They stick with basswood and butternut. And even these species vary in quality. "I can tell by picking up a piece of basswood how it will carve," Pete states. "The lighter and whiter it is, the better it is, and probably the farther north it grew. There's all the difference in the world between slow-grown northern basswood that's straight, creamy, and carves easy, and southern basswood that's harder, heavier, and somewhat stringier.

"Most of the time, plain-grained basswood is best for chip carving," Pam adds. "But now that I'm doing some scene-type designs on pieces, such as a sailboat, I look for basswood in which the grain suggests an element, like waves."

About butternut, Pam has nothing but praise. "Usually with wood, the darker streaks in the grain are harder and make you lose control when your knife hits them. Not with butternut. It carves like basswood, even though it's somewhat harder."

Because the pair turn out so many items in a year, Pam and Pete buy their wood by the pallet load. And the first thing they do when it arrives is sort. "We snap the bands and then start dividing the wood into carving and non-carving stock. A board of carving stock might end up as the front panel of a spice cabinet. The non-carving stock would be the back and sides," Pam explains. "First, we feel it for weight. Next, we check for straight grain and num-

Above: **A paper-clip holder, a hanging scissor holder, and a box for business cards are good sellers at about $20 apiece.**

Below: **The hangers can hold keys or necklaces. The container in the middle was designed for pencils or dried flowers.**

ber of knots. Any basswood with gray stain we stay away from for carving because it's unpredictable—either spongy or hard."

Production carving, one piece at a time

With a retail outlet in Silver Dollar City, an area theme park, and a newly opened shop in Branson, Pam has to make the most of her carving hours. And she does, by applying production techniques to the carving of individual pieces.

"For new designs, I like to lay them out directly on the wood with a pencil. That way, I can always sand off mistakes before I make a pattern for reproduction," she says. When the pattern is perfected, or one chosen to apply to several pieces, Pam beams in anticipation of the work to come. "I like production, when I can lay out as many as 20 things at a time. I mark the pattern on each one, right on down the line."

She makes her cuts efficiently, too. "Although I complete each piece individually, I do make all the cuts that go in one direction first, then all the cuts that go in a different one," says Pam. "It's much like doing appliqué work with fabric.

"When you get to a corner, you have to pivot the fabric under the machine's pressure foot in order to keep the stitches uniform. In chip carving, you cut with the grain until it makes you stop by changing direction," the carver explains. "Then, you must pivot the workpiece to continue. You never want to fight the grain. Half of the chip-carving process is knowing when to turn the wood for a cut. And I make cross-grain cuts the last thing that I do."

Pam has the process down perfectly, as a close look at her work demonstrates. And there's no sandpaper involved. Any roughness, she calls it clatter, in a cut—caused by trying to take off too much wood at once—she'll go back and shave off.

All that cutting and pulling of the knife through the wood could take its toll on Pam. That is, if she weren't prepared. But Pam lifts weights each morning to tone her arms and shoulder muscles for the long carving day ahead. The weight session leads her to give one solid piece of advice for would-be chip carvers. "Be sure you have enough grit to make the knife go where you want it to go." As she said, it looks simple, but it ain't all that easy.

Written by Peter J. Stephano
Photographs: Bob Hawks

Pam's tips for beginning chip carvers

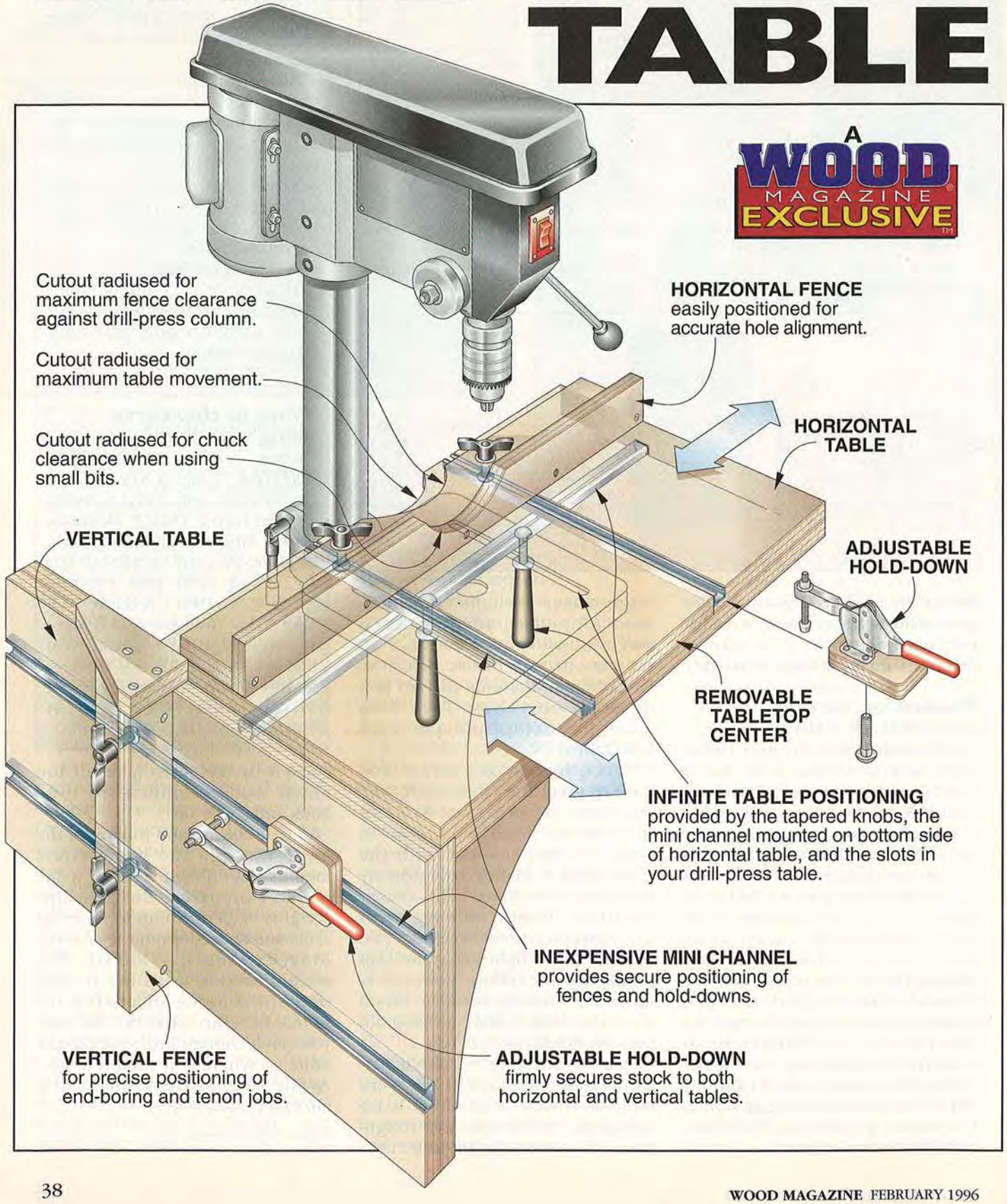
- Push the work forward on your lap. This keeps your elbow close to your body for more control.
- Rest your knife hand on the workpiece, keeping the knife and thumb together, but for safety, never pull the knife toward your thumb.
- Work your carving from the inside to the outside—your hand won't rub over the carved sections.
- Make impressions last.
- If a piece of your carving splits out, dab glue on the place with a needle and stick the chip back in.

Want to chip carve along with Pam?

Pam's books, *Basic Chip Carving*, *Chip Carving the Southwest*, and *Chip Carving Pennsylvania Dutch Designs*, all by Shiffer Publishing Ltd., Atglen, Pa., are available for $12.95 ea. (US), plus $3 shipping. Write Pam Gresham, P.O. Box 6136, Branson, MO 65616. If you're visiting Branson, you can see Pam and Pete's work at Valley Road Woodcarvers in Silver Dollar City, and at Masterworks, Ltd., in Branson.

Print this article

THE SUPER-VERSATILE DRILL-PRESS TABLE


A WOOD MAGAZINE EXCLUSIVE
Cutout radiused for maximum fence clearance against drill-press column.
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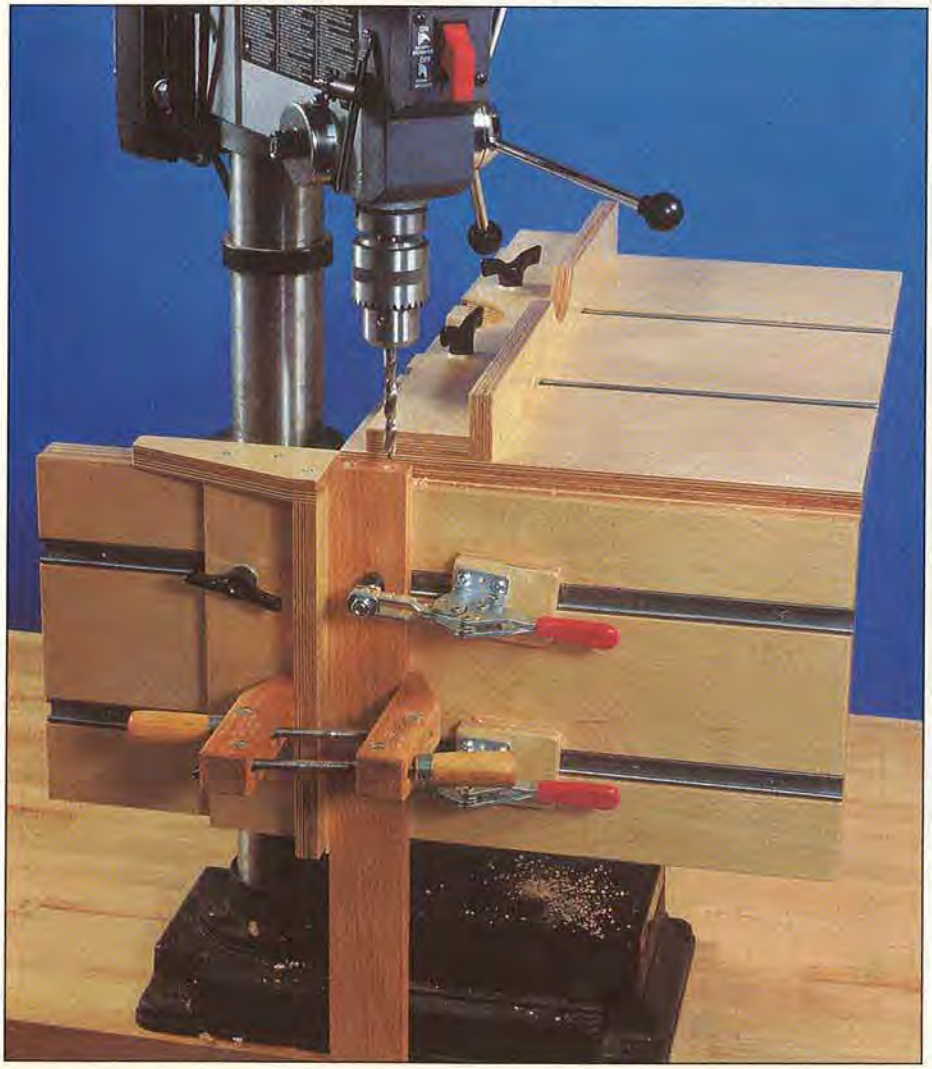
HORIZONTAL FENCE easily positioned for accurate hole alignment.
HORIZONTAL TABLE
VERTICAL TABLE
ADJUSTABLE HOLD-DOWN
REMOVABLE TABLETOP CENTER
INFINITE TABLE POSITIONING provided by the tapered knobs, the mini channel mounted on bottom side of horizontal table, and the slots in your drill-press table.
INEXPENSIVE MINI CHANNEL provides secure positioning of fences and hold-downs.
VERTICAL FENCE for precise positioning of end-boring and tenon jobs.
ADJUSTABLE HOLD-DOWN firmly secures stock to both horizontal and vertical tables.

Quality workmanship depends in large part on the accuracy of your tools. With this in mind, we set out to make your already hardworking drill press into the ultimate precision-machining center. To do this, Jim Downing, our Design Editor, and Chuck Hedlund, our trusty Project Builder, designed and tested several prototypes before settling on this L-shaped table coupled with a pair of firm fences and hold-down clamps. As shown on *pages 42–43*, this setup will allow you to perform numerous machining processes with impressive precision. See the Buying Guide at the end of the Bill of Materials for our source of hardware and Baltic birch plywood.

Start with the horizontal and vertical table pieces

1 Cut the horizontal table (A) and vertical table pieces (B) to the sizes listed in the Bill of Materials. (Due to its stability and strength, we used ¾" Baltic birch plywood as sourced in the Buying Guide.)

2 To make the radiused support (C), cut a piece of ¾"-thick plywood to 5¼×10¼". Mark a 9" radius and cut the support to the shape shown on the Front View drawing on the next page.



3 Cut the horizontal table tops (D, E) to size. (After using the drill-press table awhile, the center piece will get several holes drilled into it. For ease in replacing the table top center E, we constructed the table top out of three pieces rather than one.)

4 Using a hacksaw, crosscut five pieces of metal mini channel to the lengths listed on the Exploded View drawing. (We used B-Line Systems B72 mini channel. See the Buying Guide for our source.) Drill *countersunk* mounting holes at 4" intervals through the mini channel for screwing to the plywood tables later.

5 Mark the location of the groove on the bottom surface of the horizontal table (A). Position the table on the top of your metal drill-press table. Looking through the slots on your drill-press table, verify that the marked groove crosses at least two of the grooves in your metal table. If not, adjust the position of the groove.

6 Using a dado blade in your tablesaw, cut 13/16" dadoes, rabbets, and grooves (wide enough to house the mini channel just cut) in parts A, B, and D, where dimensioned on the Exploded View and Front View drawings.

7 Drill countersunk holes, and glue and screw A to the *inside* B in the configuration shown on the drawings. Drill more countersunk mounting holes, and drive screws through the *outside* surface of A and B to secure the radiused support (C) to keep the pieces (A, B) exactly 90° from each other.

8 Drill countersunk holes through the *inside* surfaces of A and B to secure the outside B and table tops D and E. The Ds are glued and screwed to A, the removable piece E is just screwed in place. Glue and screw the second B to the assembly. Cut a 2½" radius centered on the back edge of A/E.

9 Screw the five pieces of mini channel in place.

Continued

DRILL-PRESS TABLE

Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
TABLE ASSEMBLIES					
A horizontal table	¾"	15"	24"	BP	1
B vertical table pieces	¾"	11"	24"	BP	2
C support	¾"	5¼"	10¼"	BP	1
D table top sides	¾"	8½"	15"	BP	2
E table top center	¾"	7¾"	15"	BP	1
FENCES AND HOLD-DOWNS					
F horizontal fence base	¾"	3"	24¾"	BP	1
G horizontal table fence	¾"	2"	24¾"	BP	1
H vertical fence base	¾"	3"	11"	BP	1
I vertical table fence	¾"	2"	11"	BP	1
J end guide	¾"	2⅝"	6"	BP	1
K hold-down bases	⅝"	2¼"	3¼"	BP	2

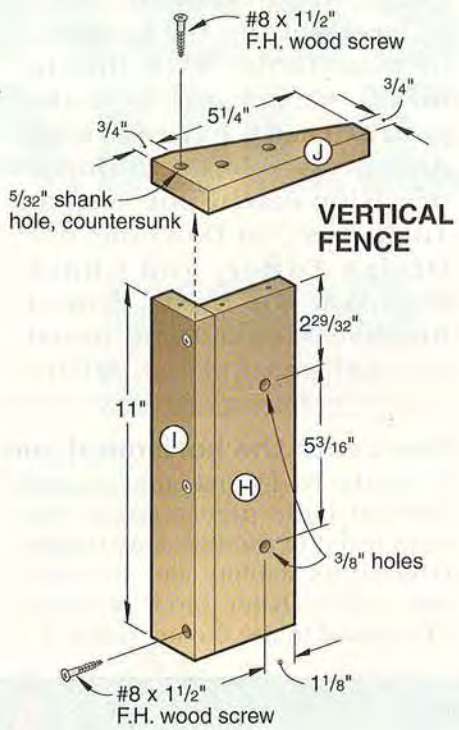
Material Key: BP–Baltic birch plywood

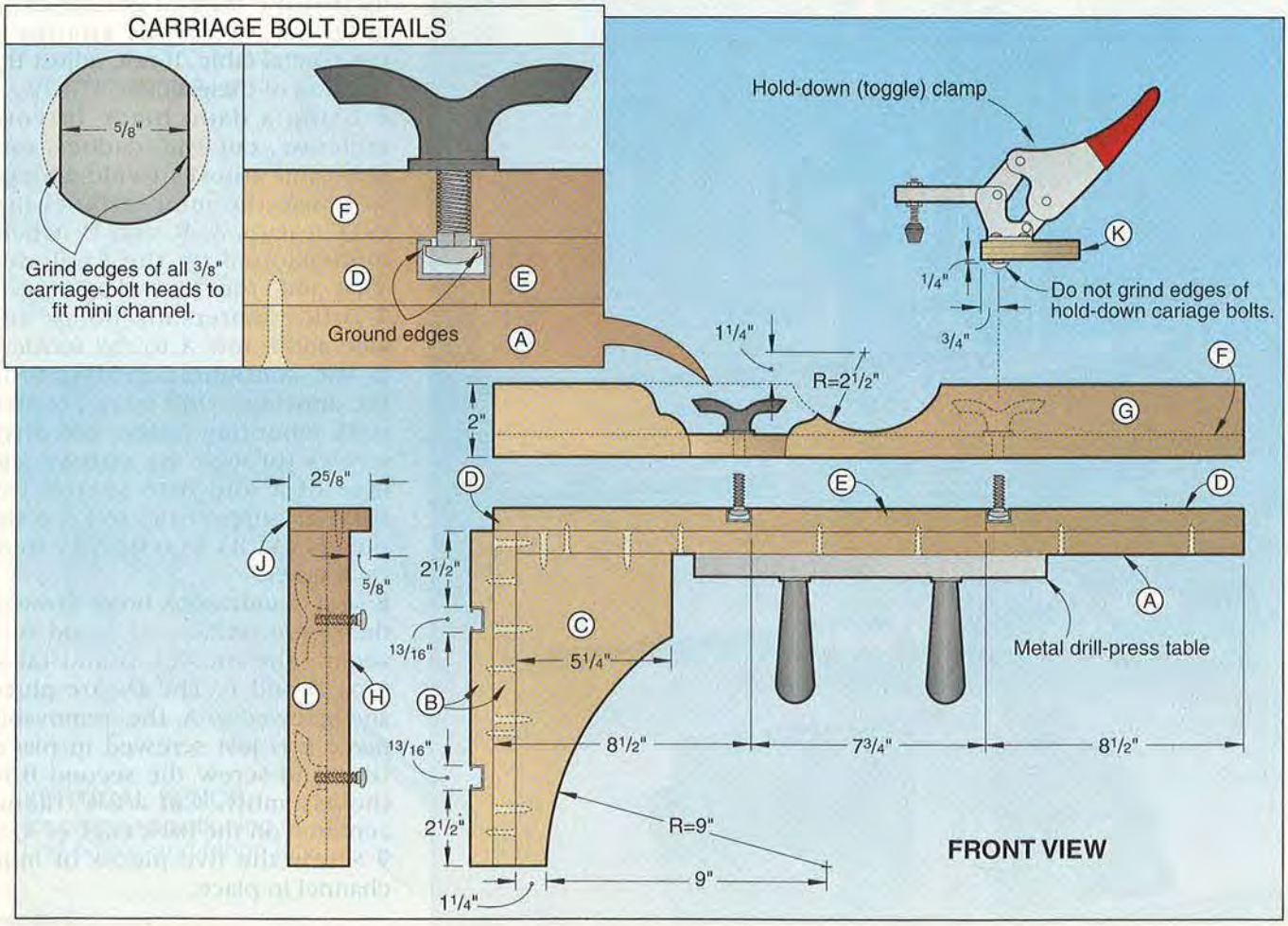
Supplies: #6x⅝", #8x1¼", #8x1½" flathead wood screws; 6–⅜x1½" and 2–5/16x1" carriage bolts; 2–5/16" locknuts; 6–5/16" flat washers; 3–⅜x13/16x24" mini channel; 2–⅜x13/16x15" mini channel; 8–#12x⅝" panhead sheet metal screws, clear finish.

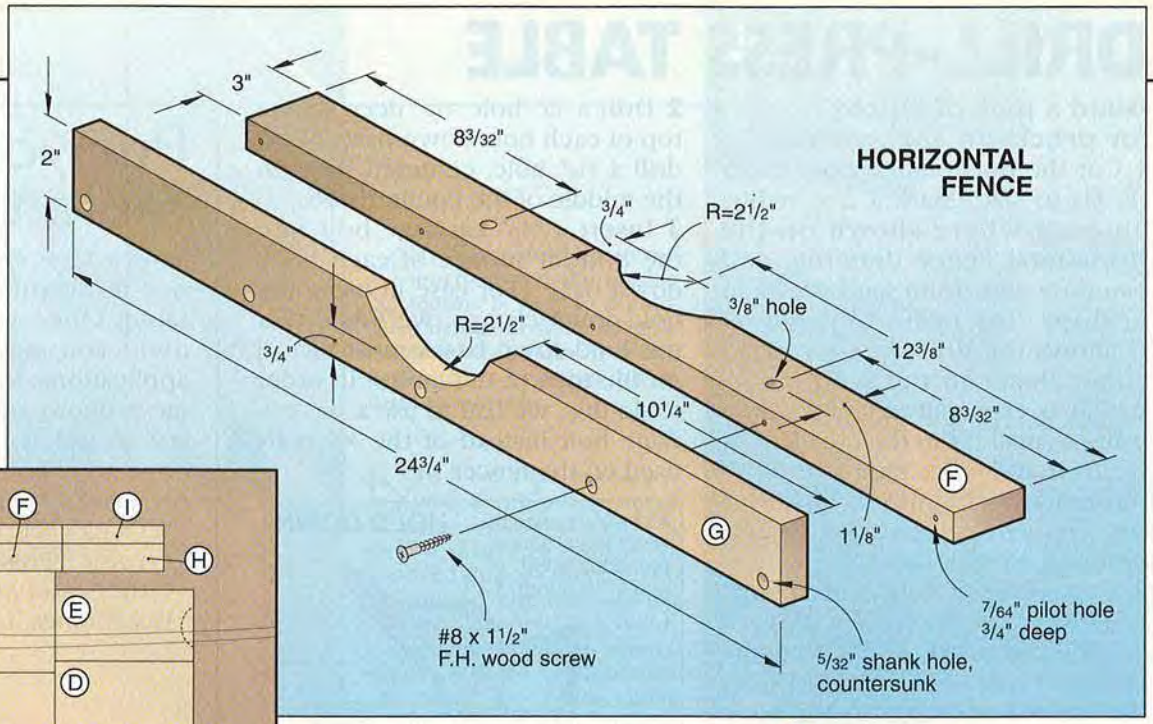
Buying Guide

Hardware kit. Five pieces of ⅜x13/16" mini channel cut to length; two 2"-reach hold-down (toggle) clamps; four plastic wing nuts (knobs), two 3⅞"-long oval-tapered knobs, six ⅜" carriage bolts 1½" long, and two 5/16" carriage bolts 1" long, plus screws, washers, and locknuts listed above. WOOD KIT DPT1, $59 plus $3.75 shipping. Schlabaugh and Sons Woodworking, 720 14th Street, Kalona, IA 52247 or call 800/346-9663 to order.

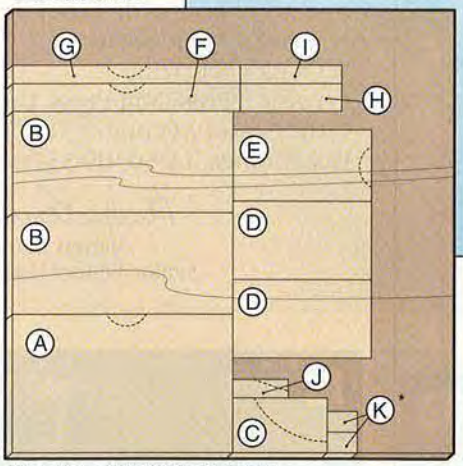
Ready-to-assemble kit. All the pieces listed in the hardware kit *above*, plus all the Baltic birch plywood pieces listed in the Bill of Materials cut to size and shape with predrilled holes. WOOD KIT DPT2, $149 plus shipping (call for shipping charges) Schlabaugh and Sons Woodworking, address and phone number above.



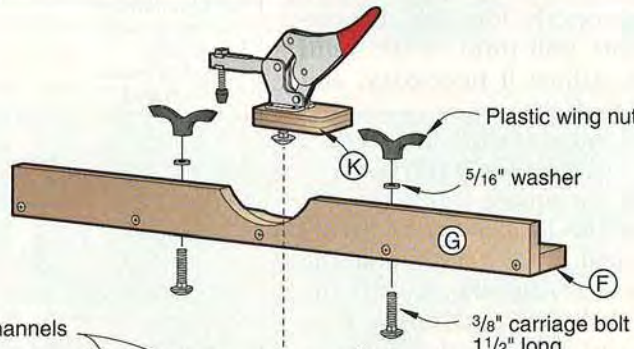




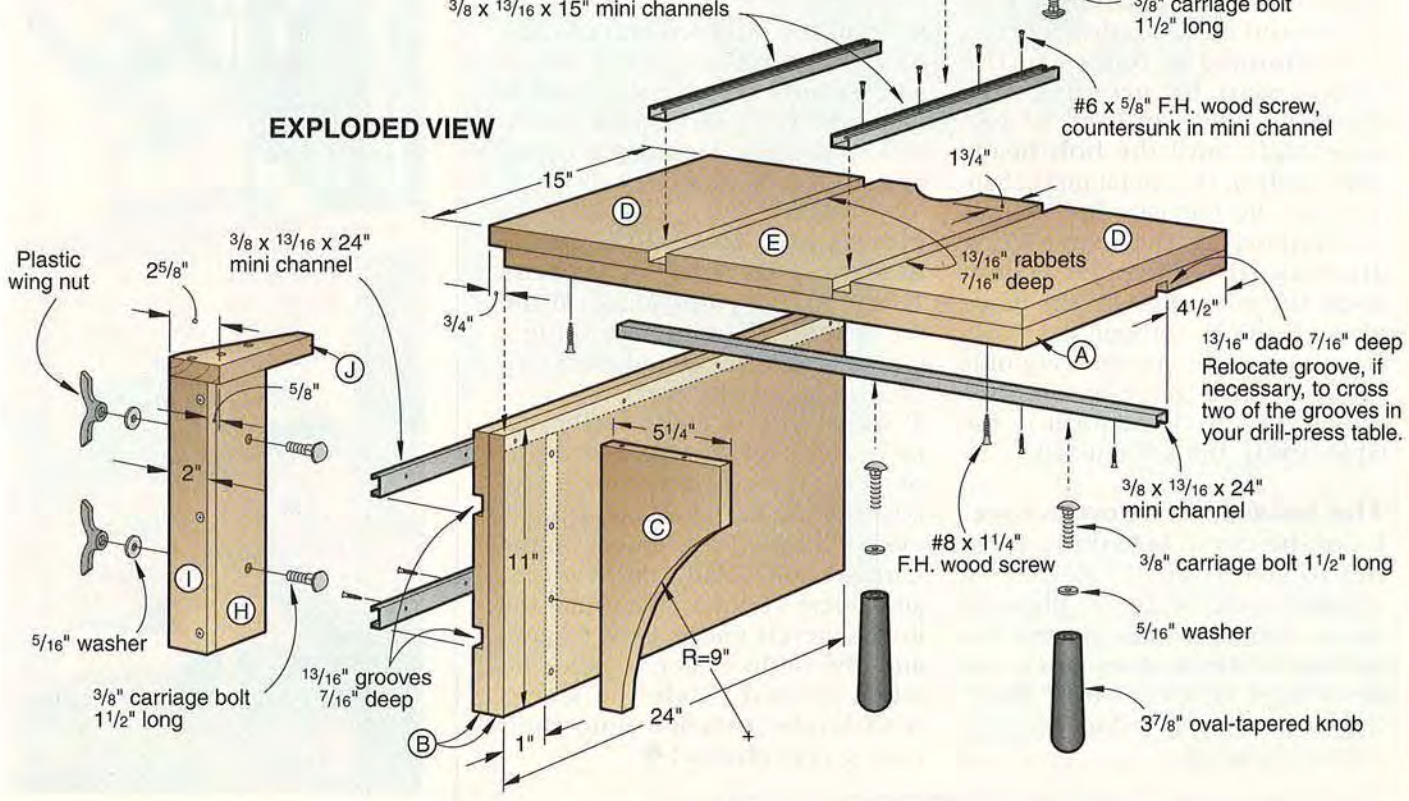
CUTTING DIAGRAM



3/4 x 48 x 48" Birch plywood
*Plane or resaw to thickness listed in Bill of Materials.



EXPLODED VIEW



DRILL-PRESS TABLE

Build a pair of fences for precision alignment

1 Cut the horizontal fence pieces (F, G) to size. Mark a 2½" radius on each where shown on the Horizontal Fence drawing, and bandsaw and drum-sand the radii to shape. The radius centered on G allows the drill-press chuck to come closer to the workpiece, which is especially helpful when using a small bit in the chuck. The radius in the fence base (F) allows the fence to be moved closer to the drill-press column when drilling into wide stock.

2 Mark a pair of hole centerpoints on the fence base (F). Before drilling the holes, verify that the marked points are centered over the dadoed openings in the table top. Improperly located, the carriage bolts will bind in the mini channel. Adjust if necessary, and drill the ⅜" holes.

3 Drill countersunk mounting holes, and screw part G to F, checking for square.

4 Repeat the process to construct the vertical fence (H, I). Cut the end guide (J) to shape, drill the mounting holes, and screw it to the top end of the vertical fence.

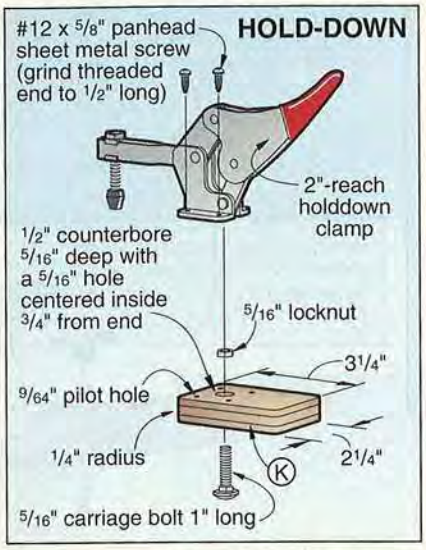
5 To mount the fences to the tables, start by grinding two opposing edges of four ⅜" carriage bolts until the bolt heads slide easily in the metal mini channel. See the Carriage Bolt details accompanying the Front View drawing for reference. Then, insert the bolts through the fence pieces F and H, through flat washers, and into the plastic wing nuts (knobs). The fence assemblies should slide back-and-forth in the tables easily, but without slop.

The hold-downs come next

1 Cut the clamp hold-down bases (K) to size from ⅝" stock (we resawed some of the ¾" plywood we used for the other pieces). For holding ¾"-thick stock later, the bases must be less than ¾" thick. Cut or sand a ¼" radius on each corner of each K.

2 Drill a ½" hole 5/16" deep in the top of each hold-down base. Now, drill a 5/16" hole, centered through the middle of the counterbore.

3 Insert a 5/16" carriage bolt into the bottom surface of each hold-down base. (For ease in using the hold-down clamps, we found that the hold-down bases must swivel on the tops of the tables. In order to do this, we had to use a 5/16" carriage bolt instead of the ⅜" bolts used on the fences.)


HOLD-DOWN
#12 x 5/8" panhead sheet metal screw (grind threaded end to 1/2" long)
2"-reach holddown clamp
1/2" counterbore 5/16" deep with a 5/16" hole centered inside 3/4" from end
5/16" locknut
3 1/4"
9/64" pilot hole
1/4" radius
K
2 1/4"
5/16" carriage bolt 1" long

4 Grind the threaded end of eight #12×⅝" panhead sheet metal screws until the threaded end is ½" long. Then, drill pilot holes, and secure one hold-down clamp to each K with four of the screws.

Here's how to secure the assembly to your drill press

1 Sand all the parts. Mask off the metal mini channel and apply a clear finish to the wood parts (we used an aerosol lacquer).

2 Secure the wooden drill-press table to the metal table with a pair of ⅜" carriage bolts (with the edges of the head ground as previously explained and shown on the Carriage-Bolt detail), flat washers, and tapered knobs. (We found the long tapered knobs easy to grab and the table easier to relocate when needed.) Slide the fences with knobs attached onto their mating mini channel.

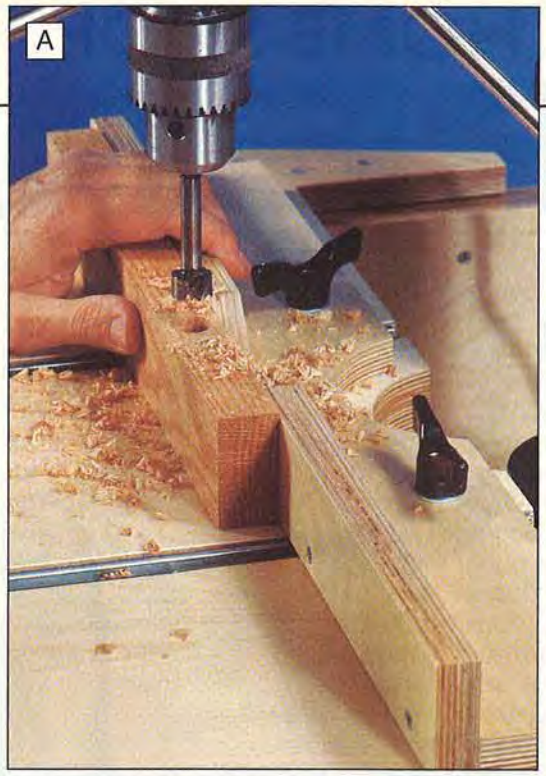
Put your new table to work

Shown here are several uses for our multi-purpose drill-press table. Once you've built your own, you may discover other applications, too. If you do, send me a photo and description. I'll try to get it in an upcoming issue to share with other readers. Send your ideas to:

WOOD® Magazine
Precision-Plus Drill-Press Table
1912 Grand Avenue, #310
Des Moines, IA 50309-3379.

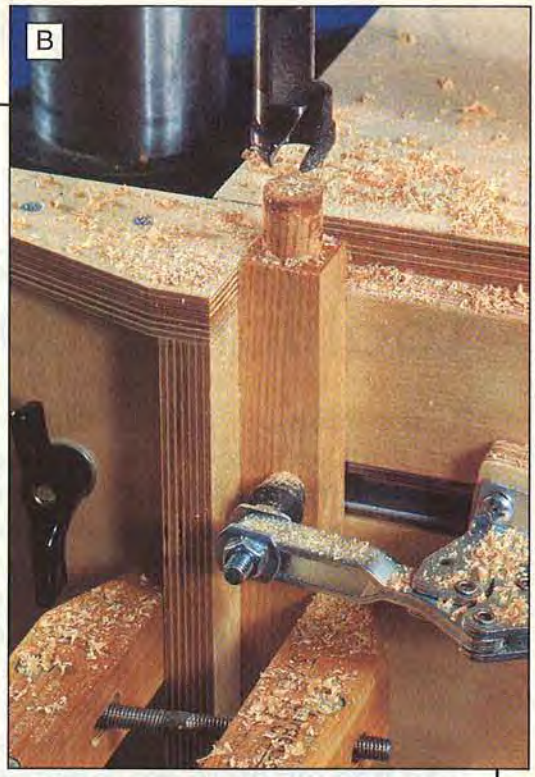
Marlen Kemmet
Marlen Kemmet
Senior Editor/ How To

Written By Marlen Kemmet Project Design: ©Meredith Corporation, All Rights Reserved
Photographs: John Hetherington Illustrations: Roxanne LeMoine; Lorna Johnson



Making round-cornered mortises and the mating tenons is easy to accomplish using our fence system. As shown in Photo A, drill a hole with a Forstner bit to form the mortise.

To form a tenon to mate with the round-cornered mortise formed at left, use a tablesaw and a V-grooved support to cut the shoulders. Then, as shown in Photo B, use the hold-downs and clamp to secure the stock to the vertical table and fence. Use a plug cutter to cut a round tenon on the end of the stock.



For drilling holes in the ends of stock, switch to the vertical fence with hold-downs. As shown in Photo C, we drilled a pair of dowel holes in the ends of a rail to mate with the stile drilled in Photo E.

To do this, mark the dowel-hole centerpoints on the ends of the rail. Next, use the hold-downs to clamp the rail to the vertical table. Loosen the collar connecting the drill-press table to the drill-press column. Swing the drill-press table to the side until the drill bit aligns directly over the marked centerpoint (you'll also have to move the rail to get it under the bit). If the bit won't align, rotate the drill-press head on the column for proper alignment as we had to do in Photo C. Adjust the position of the fence until the bit aligns with the marked centerpoint. Check that the fence is plumb. Use the hold-downs to secure the rail to the vertical table. Use a handscrew clamp to secure the piece to the fence. Without the handscrew clamp, the stock being drilled can slip slightly down the vertical table. Finally, drill the holes.

Drilling numerous holes all in a straight line is easy using the horizontal table and fence. For instance, if you need holes exactly 2" from the edge of a piece of stock, position the inside edge of the fence exactly 2" from the *center* of the bit. Now, just move the stock along the fence and all the holes will be drilled exactly 2" from the edge of the stock as shown in Photo D. You can use this same setup for drilling holes in the edge of a piece of stock as shown in Photo E. This setup is especially useful for drilling dowel holes in the edge of stiles.

7 REASONS TO BUY A HOME-SHOP SHAPER

Get yourself a serious tool for $500 to $1,000

Last winter, our project builder Chuck Hedlund came up with an interesting observation: "Have you ever noticed that by the time you pay for a router, router table, and fence, that you've spent as much as it costs for a small shaper?"

Sure enough, for around $500 you can buy a small shaper with a durable induction motor, cast-iron table, and micro-adjustable fence halves. And with the addition of an accessory collet, you can use router bits with these machines, too.

To find out more, we rounded up three router-bit-ready shapers that sell for about $500, and five of their bigger brothers that cost from $700 to $1,000. Below we'll tell you how these machines compare to working with a router and give you seven reasons why you should consider putting a shaper on your tool wish list.

Print this article

1 Induction motors: quiet and powerful

If you find the shrill whine and blazing speed of the universal motors found on routers bothersome, you'll love the slower, quieter operation of the induction motors on shapers. Induction motors transfer power to the tool's arbor by way of a belt, as opposed to direct-drive universal motors where the shaft of the motor serves as the tool's arbor.

Most of the shapers give you two speeds ranging from 7,000 to 11,000 rpm. See the chart on *page 49* for specific speeds. Shapers also enable you to reverse the direction of the spindle's rotation. This is necessary for router-bit operation, since router bits cut in a counterclockwise rotation—opposite that of shaper cutters.

An unusual feature we noticed with the Seco shaper is that it does not contain a starting capacitor which (on the rest of the machines) brings the motor up to speed as rapidly as possible. The Seco takes about six seconds to reach full speed, but this slow-start offers a safety advantage. If something is wedged between the fence and the cutter when you turn the machine on, the Seco gives you more time to react than a machine that jumps to full speed almost instantly.

The motors on these shapers run from 1 to 3 hp. The 1-hp Jet shaper provides enough power to rout with bits up to about 2" in diameter using single passes. Bigger bits, like 3" panel-raising bits, require multiple passes for a smooth cut.

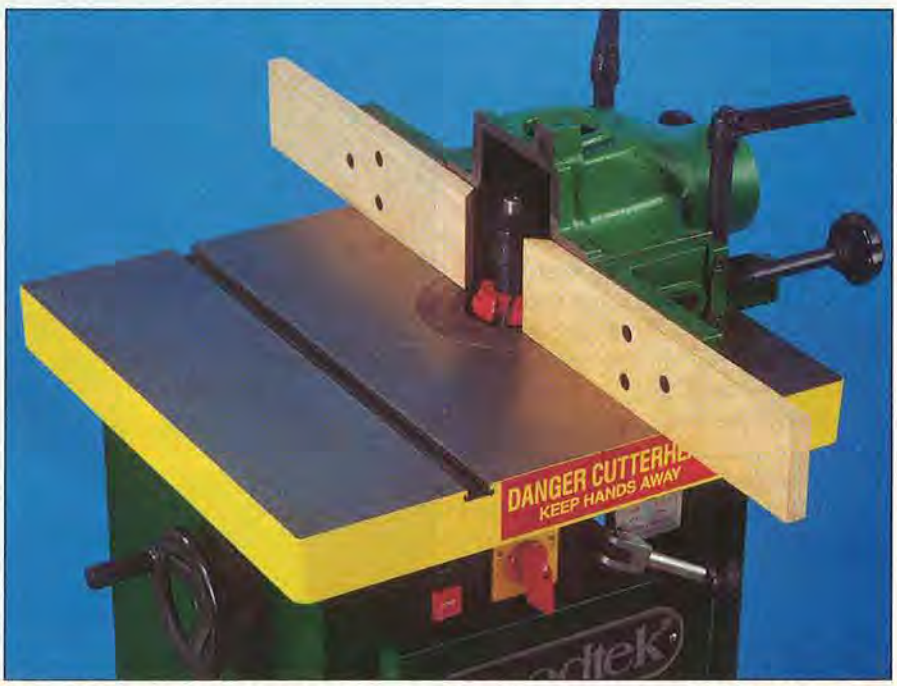
The 1.5-hp motors on the Delta and the small Enlon and Grizzly shapers provide sufficient power to rout a raised panel in a single pass with a moderate feed rate. If you want to rout raised panels or large profiles day in and day out, you're better off with a 2- or 3-hp machine. Keep in mind that these big motors require a 220-volt electric outlet in your shop.

2 Cast-iron tables eliminate misaligned profiles

Shaper tables are ground flat to a tolerance of plus or minus .004". By contrast, a laminate-covered router table may sag up to 1/16" (.0625") over its length. This sagging won't affect most routing operations, but if you try to rout cope-and-stick joints, your profiles may not fit precisely.

The tables we tested ranged from 15¾×18¼" on the Jet to 28×30" on the larger Grizzly and Enlon models. Enlon and Grizzly put the spindle in the center of the table. Delta, Jet, Seco, and Woodtek offset the spindle opening, as shown in the photo *right* to give you more support under the workpiece. The front edges of the smaller Enlon and Grizzly shaper tables are tapped, however, so you can bolt on the 10×20" cast-iron wings that both companies sell for about $60, or your own shop-made extensions.

Each of these tables offers an opening large enough to surround big panel-raising router bits and shaper cutters. Insert rings reduce the diameter of the opening to accommodate bits and cutters with smaller profiles. Our chart on *page 49* lists the number of insert rings and sizes for each shaper.



The spindle on the Woodtek shaper is offset from the center of the table, giving you more support under the workpiece.

Continued

SHAPERS

3 Elevating the cutters; it's as easy as turning a wheel

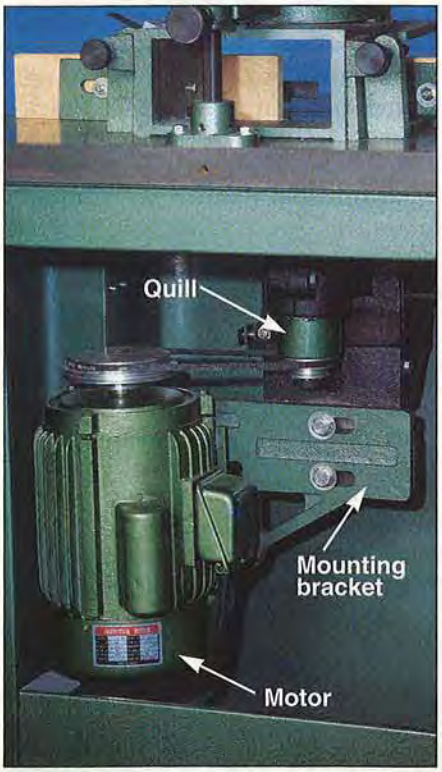
Routers require that you fiddle with a plunge mechanism or a spiral base to elevate the bit. Shapers employ a convenient handwheel.

Enlon and Grizzly mount the motor on a vertical bracket bolted to the quill (the housing for the spindle) as shown in the photo *top left.* When you turn the handwheel, the quill and motor move up or down together as a unit. But when you tighten the elevation lock on these machines, the spindle deflects about 1/16". To eliminate the movement, we tightened the gib screws, but this caused the handwheels to stick. With some trial-and-error, we found a happy medium on both machines. The spindles still moved, but we compensated by setting the fence after locking the elevation. The manual that comes with Grizzly's shaper explains these adjustments to the elevation mechanism in excellent detail. Enlon's manual makes no mention of the operation.

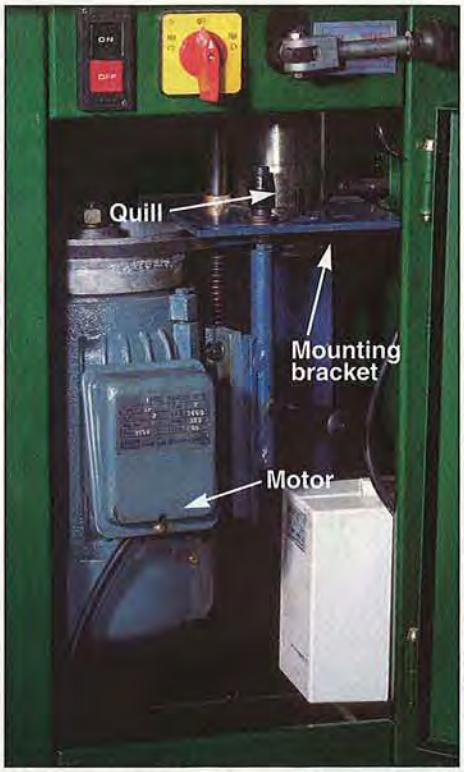
Seco's and Woodtek's quills and motors are connected by a horizontal bracket, as shown in the photo *top right.* The quill columns are positioned closer to the motor so there's less tendency for the assembly to rack or bind during elevation. And these proved deflection-free.

The Jet shaper features a fixed motor, shown in the photo *right.* Since the motor weight is carried by the stand, you can crank the handwheel effortlessly, and the quill won't deflect when locked.

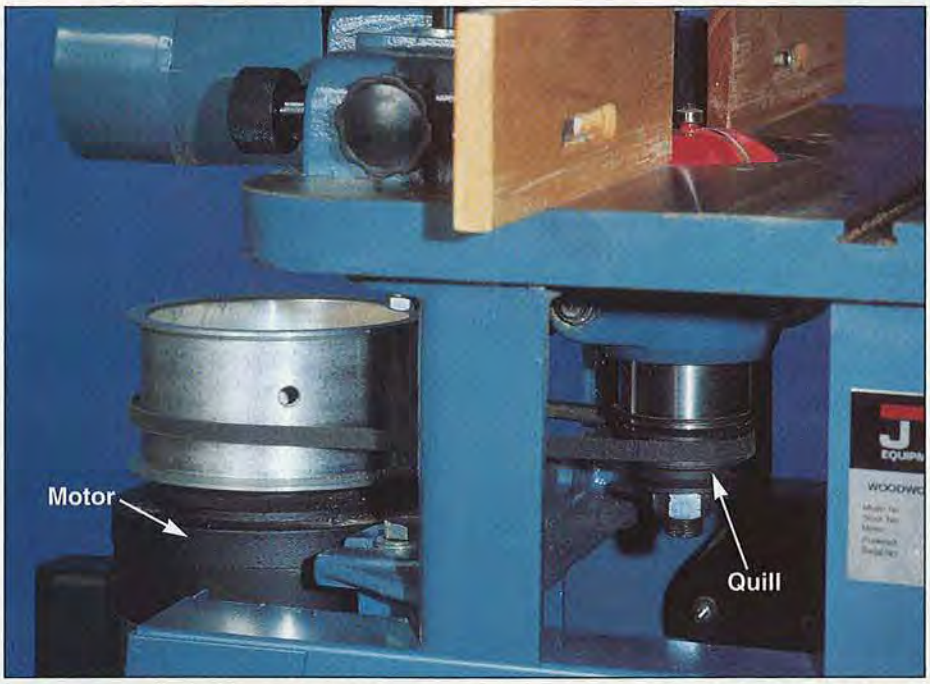
Delta's quill attaches to the motor carriage via two steel pins, as shown in the photo on *page 47.* However, this system also deflects when locked.



The motor and quill assembly on the Grizzly shaper are bolted together and move up and down on a horizontal mounting bracket.



A horizontal plate and steel rods hold the Woodtek motor in close vertical alignment to a massive quill assembly for deflection-free locking.



The Jet shaper anchors the motor on the stand and provides a large drum for the belt to ride up and down on.

4 Micro-adjustable split fences

All the shapers in the test came with "micro-adjustable" fences that enable you to move the front and back halves of the fence independently in very small increments. We liked the Jet fence adjustments best. Its fence halves lock and unlock with large knobs, and the micro-adjust knobs turn easily.

The Delta shaper also provides excellent micro-adjustment. Its stack of v-shaped fiberglass rods slide back and forth independently to conform to the profiles of shaper cutters and router bits as shown *bottom right.* When locking, however, the fence pulls slightly to one side which makes positioning tricky.

Seco's dust hood connects to two aluminum fence halves for a lightweight and easy-to-move assembly, shown *top right*. A hinged plastic hood snaps open for quick access to the spindle, and a flexible steel bit guard mounts in holes located on the top of the fence halves. But the fence is only adjustable on the outfeed side when using router bits. When working with shaper cutters you must keep the fence halves parallel.

The bolts that secure the fences to the tables on the Enlon and Grizzly machines drop into holes in the fence assembly. Once they are bolted down, the only way to move these fences is to turn both micro-adjustment knobs—a slow process if you have to move the fence a lot. The remaining machines feature slots in the top of the fence assembly so you can quickly slide the entire fence in or out the full distance of the slots.

We consider dust collection essential for shapers since they remove large amounts of material. Jet, Seco, and Woodtek shapers are ready to hook up to a 4" hose. The fences on the Delta, Enlon, and Grizzly machines require accessory dust-collection equipment. Delta,sells a formed-steel adapter for about $50, Grizzly also sells a formed-steel adaptor for $15. Enlon sells its cast-iron dust hoods for about $30.

Continued

Seco's fence includes a hinged lid and a steel safety guard that mounts in holes in the top of the fence halves.

V-shaped slats on the Delta shaper fence conform to the profiles of different bits and cutters.

THE SEARS SHAPER Good performance, but no router-bit collet

Even though we focused our test on shapers that accommodate router bits, we were curious about the Sears Craftsman Contractor Series High-Speed Wood Shaper. It doesn't take router bits, but it performs well as a light-duty shaper. And the $390 price tag makes this machine less expensive than any in our test.

Sears put a webbed cast-iron table top and a splayed-leg stand on this tool. To raise the spindle, you push a lever rather than turn a wheel. And the single-speed (9,000 rpm), 1hp, reversible motor delivers decent power—enough to shape ogees and other edge profiles in a single pass, but not enough for raised panels without multiple passes. The fence micro-adjustment mechanism works well with no slop.

Sears sells a variety of high-speed-steel shaper cutters for this ½"-spindle shaper, but no carbide. If this machine fits your needs, we suggest you invest in some ½"-bore carbide cutters. These cost $25 to $40 each, but they'll outlast the high-speed steel.

SHAPERS

5 Accessory collets will accept your router bits

With accessory router-bit collets there's no need to abandon your router bits when you buy a shaper. We found four styles of collets on these machines.

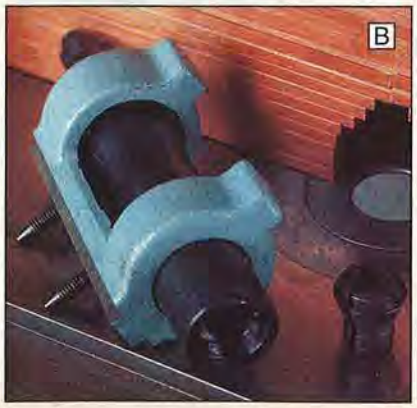
Seco and Woodtek provide the most massive router-bit collets, as shown in photo A. These tapered collets are pulled into the top of the quill by a long draw bar that runs up through the middle of the quill and screws into the bottom of the collet. At the bottom of the quill, you tighten a nut around the draw bar. When the nut is tight, the entire mass of the spindle helps to stabilize the router bit. The Woodtek collets, ½" and ¼", come as standard equipment. Seco charges about $25 per collet.

Delta's router-bit collet, photo B, requires a separate, quill (about $80). It screws into the quill and also offers lots of mass.

The chuck-style collets found on the shapers from Enlon and Grizzly, shown in photo C, secure the router bit with a nut that screws down over the top of the collet. Since these taper in toward the top, they don't offer much support against side pressure when the router bit is plowing through a piece of wood. They also stand 2" higher than the other style of collets and this tends to amplify vibration. These collets are sold as optional accessories by both companies, include an insert for ¼"-shank bits, and cost between $40 and $50.

The collet on the Jet shaper, photo D, comes as standard equipment and tapers in towards the bottom. This gives you lots of mass around the shank of the router bit where the extra metal helps to absorb vibration.

None of these router collets proved runout-free, however. Runout is a variation in the concentricity or roundness of a bit or cutter. This variation causes vibration—much like an out-of-balance tire. (See our runout test results on the chart on *page 49*.) Given this, we were concerned at first about the quality of cut we would get using router bits. But we got good results—smooth cuts and no chatter or scalloping—with router bits in all the shapers.



A. Seco's router-bit collet offers the most mass and is pulled tight into the spindle from below by a threaded draw bar.
B. Delta designed a separate quill assembly to hold router bits in its shaper.
C. Grizzly uses a chuck-style collet and a phenolic insert to hold router bits.
D. Jet's router bit collet also is tightened on top with a nut, but has more mass at the top of the collet.

6 Changing bits and cutters is easy

Most woodworkers find that changing router bits on a table-mounted router is tricky and often frustrating. Here, again, shapers offer an advantage.

The Seco and the Woodtek shapers feature a convenient spindle lock. Simply push a lever to lock the spindle, and then turn the nut at the top of the quill to loosen the shaper or router bit. The other shapers require two wrenches, one at the top of the quill and one at the bottom. But you can reach the top nut from above the table, making this an easy operation.

7 Shaper spindles stand up to heavy loads

All the machines in our test come with ½" and ¾" spindles. The Seco and the big shapers from Enlon and Grizzly also include 1" spindles as standard equipment.

You'll find the greatest selection of shaper cutters in the ¾"-spindle size. But you also can buy snap-in bushings that enable you to put ¾" cutters on ½" spindles. The ½" spindles, however, don't offer much resistance against the massive side loads a shaper cutter receives. For medium-duty shaping, we recommend you stick with the ¾" spindles. And for long production runs, heavy-duty work, or work with a power feeder, go with the 1" spindle size.

The Seco shaper features a spindle that tilts 45° towards the front of the machine and 10° towards the rear. This tilting spindle enables you to change the cutting profile of your router bits or shaper cutters and make odd-angle cuts like a 10° chamfer.

Written by Tom Jackson
Technical consultant: Bob McFarlin
Photographs: John Hetherington

Enlon EN3302

Grizzly G1035

Jet JWS18HO

Delta 43-355

Enlon EN3303

Grizzly G1026

Seco SK28SP

Woodtec 805-986

Our recommendations

Router tables still deserve a place in most shops. Benchtop router tables are compact and easy to store, and you can always detach the router and use it freehand. But if you find you need a super-flat table, or if you do a lot of work with the bigger router bits, then a small- or medium-size shaper may be a wise investment.

We chose the Jet as our favorite in the $500 range. It's got the best fence of any shaper in this category. Of the larger shapers, we call it a tie between Seco and Woodtek. The Woodtek has the heaviest quill housing, quill, bearings, spindles, and router collet in the test. It should hold up well under years of rigorous use. The Seco, with its big aluminum fence, tilting arbor and large table, impressed us as the most versatile and user-friendly machine.

RATING AFFORDABLE SHAPERS

	MANUFACTURER/ IMPORTER	MODEL NUMBER	MOTOR: SPEEDS (RPM)	MOTOR: HORSEPOWER	MOTOR: VOLTAGE	TABLE: SIZE (INCHES)	TABLE: OPENING SIZE (INCHES)	TABLE: STARTING PINS (YES, NO)	SPINDLES: SPINDLE LOCK (YES, NO)	SPINDLES: ELEVATION (NUMBER OF TURNS ON HAND WHEEL)	FENCE: FENCE TYPE (1)	FENCE: FENCE FACE (2)	FENCE: FACE SIZE ONE-HALF (INCHES)	PERFORMANCE (3): RUNOUT (4) SPINDLE 1/2"	PERFORMANCE (3): RUNOUT (4) SPINDLE 3/4"	PERFORMANCE (3): RUNOUT (4) SPINDLE 1"	PERFORMANCE (3): RUNOUT (4) ROUTER COLLET 1/2"	PERFORMANCE (3): RUNOUT (4) ROUTER COLLET 1/4"	PERFORMANCE (3): EASE OF FENCE MICRO-ADJUSTMENT	PERFORMANCE (3): PERFORMANCE	OVERALL RATING (5): VALUE	COUNTRY OF ORIGIN (6)	WEIGHT (POUNDS)	SELLING PRICE (7)	COMMENTS
UNDER $500	ENLON	EN3302	7,000 10,000	1.5	110/ 220	18 x 20 1/4	1 1/4, 3 1/2, 5 1/8	Y	N	60	CI	W	10 x 2 3/4	G	E	--	F	F	G	8	9	T	230	$375*	Optional dust hood ($29) and quick-change kit ($16) improve performance of fence.
	GRIZZLY	G1035	7,000 10,000	1.5	110/ 220	18 x 20 1/4	1 1/4, 3 1/2, 5 1/8	Y	N	60	CI	W	10 x 2 3/4	G	E	--	G	G	F	8	9	T	225	425*	Can be ordered with an optional dust hood for the fence ($15) that improves convenience.
	JET	JWS18H0	7,000 9,000	1	110/ 220	15 3/4 x 18 1/4	1 3/4, 3 1/1, 5 1/4	Y	N	3/4	CI	W	10 x 3 1/4	E	E	--	G	E	E	9	10	T	170	499	A bit less horsepower than the others, but a great fence and loads of convenience.
$500 TO $900	DELTA	43-355	7,000 10,000	1.5	110/ 220	18 x 30	1 3/8, 3, 5	Y	N	9 1/2	CA	SF	10 x 4	E	E	--	F	F	E	9	7	T	180	799	We liked the innovative fence and large table size, but they come with a steep price tag.
	ENLON	EN3303	7,000 10,000	3	220	28 x 30	1 3/8, 2 3/4, 4, 5 1/2	Y	N	58	CI	W	12 x 2 3/4	E	E	G	F	F	G	8	9	T	390	695*	Optional dust hood ($30) and quick-change kit ($18) improve performance of the fence.
	GRIZZLY	G1026	7,000 10,000	3	220	28 x 30	1 3/8, 2 3/4, 4, 5 1/2	Y	N	58	CI	W	12 x 2 3/4	G	E	E	E	G	F	8	9	T	365	795*	Can be ordered with an optional dust hood for the fence ($15) that improves convenience.
	SECO	SK28SP	3,000 6,000 9,000	3	220	23 1/2 x 27	4 1/8, 6 1/8	N	Y	4 1/2	CA	EA	13 x 5	--	E	E	G	G	E	9	10	T	340	899*	Lots of unique user-friendly features, but only one half of the fence is adjustable. Miter slot measures an odd size: 3/4x3/16".
	WOODTEK	805-986	7,000 11,000	2	220	19 3/4 x 19 3/4	2 1/2, 3 1/4, 4 1/4, 5 1/4, 6 1/8	N	Y	40	CI	W	14 1/2 X 3 1/2	E	E	--	G	--	E	9	10	T	360	985	The heavyweight of the test. Price includes shipping and router-bit collets.

NOTES:

1. (CI) Cast iron
   (FS) Formed steel
   (CA) Cast aluminum
2. (W) Wood
   (SF) Sectional fiberglass
   (EA) Extended aluminum
3. E Excellent
   G Good
   F Fair
   P Poor
4. E .002" or less
   G .003 - .006"
   F .006 - .009"
   P Over .009"
5. On a scale of 1-10 with 10 being the best possible score.
6. (T) Taiwan
7. (*) Shipping not included

Who to call for more information

Delta: 800/438-2486
Enlon: 800/888-9697
Grizzly: 800/541-5537
Jet: 800/274-6848
Seco: 800/225-7326
Woodtek: 800/645-9292

Scrollsaw these terrific coasters

FLAMINGOS UNDER

Don't risk a coaster shortage this year! Fashion a flock of these fabulous flamingo coasters to help keep your furniture ring-free.

Start with the inlay

1 Cut four ⅛×4½×4½" blanks, two from dark-colored stock and two from lighter-colored material. (We used beech and walnut.) Stack the pieces in sets of two, one light and one dark, with the grain running in the same direction. Fasten each set together for stack-cutting, using a spot of double-faced tape in each corner. Each stack will yield two inlaid designs, each the negative of the other.

2 Photocopy the two Full-Sized Coaster patterns in the *WOOD PATTERNS™* insert in the middle of the magazine. Adhere a pattern to the top of each cutting stack with spray adhesive. (No, it doesn't matter which side you call the top.)

3 Drill 1/16" blade start holes on the design line (Line A) where shown, and thread the scrollsaw blade to begin cutting. To achieve a tight fit between parts, install a no. 2 blade, .028–.029×.012–.013" with 20–23 teeth per inch. (For a less-obtrusive start hole with such a fine blade, you could use a smaller twist drill, such as a 1/32" or a no. 67, chucked in a drill press.) Cut around the design. (On the two-legged flamingo, cut out between the legs first.)

4 Separate the cutouts. Then, insert the center piece or pieces from the beech into the walnut piece and the walnut center into the beech.

5 Epoxy-glue the inner and outer parts of each inlaid piece to a ⅛×4½×4½" blank that's the same species as that surrounding the inlay. That is, glue the walnut square with the beech inlay to another piece of walnut; the beech piece inlaid with walnut to beech. Clamp between two pieces of ¾"-thick scrapwood, placing waxed paper on top of the inlaid piece. Unclamp, clean off the squeeze-out, then reclamp.

6 Draw lines B and C on the unpatterned pieces. To do this, draw diagonal lines on the inlaid square to locate the center. Then, draw circles of the diameters shown around the center.

Surround it with a rim

1 Temporarily attach the laminated, inlaid square on top of a ½×4½×4½" piece of stock. (We used cherry.) A spot of double-faced tape at each corner will hold them together.

2 Drill a blade start hole on the inside edge line (Line B). To make a tight fit between the rim and the inlaid center, tilt the scrollsaw table to 1°, then saw around the line, keeping the workpiece center on the low side of the table. (The angle can vary slightly, depending upon the exact thickness of the wood layers and the

GLASS

width of the blade kerf, so make a test cut on scrap material.)

3 Return the table to level, then saw around the outer line (Line C). Separate the pieces. Keep the ¼"-thick laminated inlaid center and the ½"-thick outer rim. Remove the remaining patterns.

4 Finish-sand the face of the inlaid center with 150-, 220-, and 320-grit sandpaper. Sand slight roundovers on the top edges of the rim, and finish-sand its outside edge. (Don't sand the inside of the rim and the outer edge of the center; that would spoil the fit.)

5 Epoxy-glue the rim to the inlaid center, placing the bottoms of the center and rim flush. Spray semi-gloss polyurethane (or any other durable, clear finish) on both sides of the coaster.

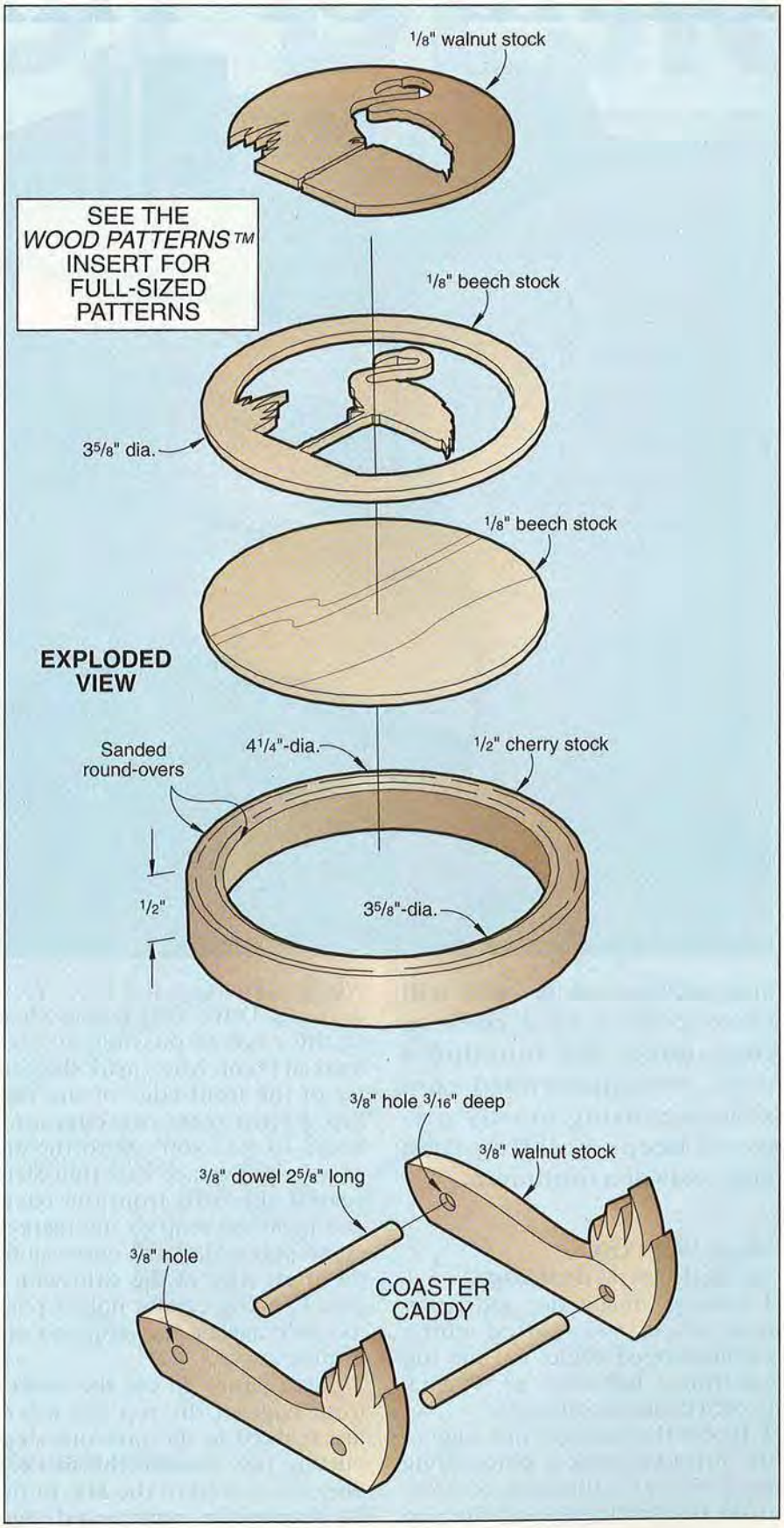
Construct a caddy

1 Stack two ⅜×5×3" pieces of stock for cutting (we used walnut). Hold them together with double-faced tape.

2 Adhere the Full-Sized Reversed Base Pattern to the stack. The side you attach the pattern to will be the backside of the caddy's back piece. Scrollsaw around the pattern line. (We used a Reverse-tooth blade to minimize splintering on the front surface.)

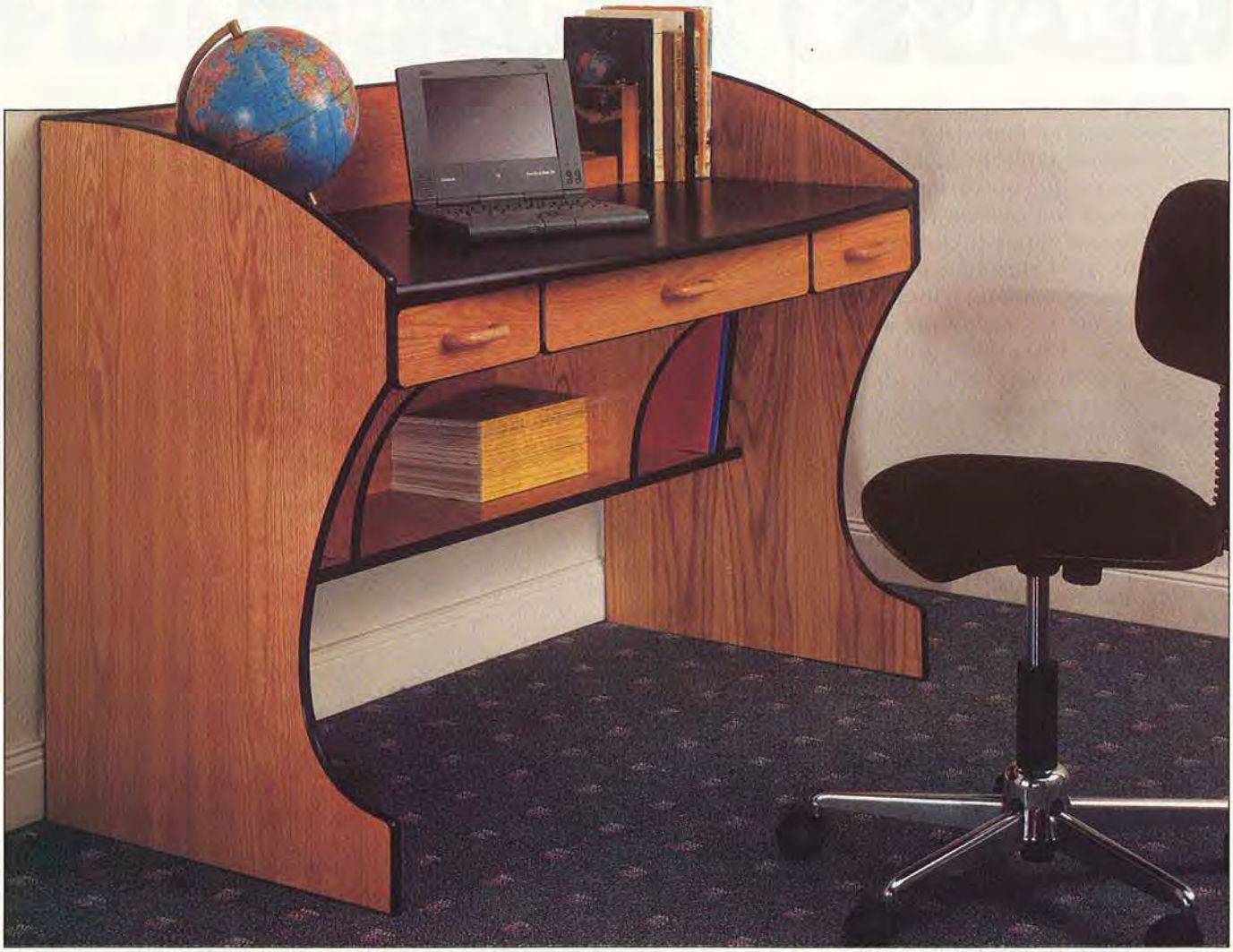
3 Drill a ⅜" hole (or a size to fit your ⅜" dowel rod) 9/16" deep at each marked location. Separate the cutouts, and sand.

4 To make a caddy for four coasters, cut two 2⅝" lengths of ⅜" dowel rod. (Multiply ½" by the number of coasters and add ⅝" to the result to determine the dowel length for other coaster-set sizes.) Glue them into the base holes as shown in the Exploded View drawing. Apply a clear finish to the caddy.



Project Design: Bill Zaun
Photograph: John Hetherington
Illustrations: Roxanne LeMoine; Lorna Johnson

HEAD OF THE CLASS



Students and adults alike will enjoy pulling up a chair to this simple but functional desk. Straightforward construction using mostly plywood keeps building time and costs at a minimum.

Start with the curved-front desktop

1 Using a straightedge and a portable circular saw fitted with a carbide-tipped blade, cut the top (A) from a half-sheet of ¾"-thick particleboard to 26½×47½".

2 To cut the curved front edge of the top (A), mark a point along each side at a distance of 23⅛" from the back edge of the top where shown on the Parts View drawing. Drive a #4 nail as close to the edge as possible at each marked point. Now, mark the center of the front edge of the top. Rip a strip from the edge of a board to ⅛×¾×60". With the aid of a helper, place this thin strip against the nails from the back, and push the strip to the marked centerpoint. Mark the curve along the front edge of the strip with a pencil, being careful not to push too hard against the strip and distort the curve.

3 Use a jigsaw to cut the curved front edge of the top (A) where just marked in the previous step, cutting just outside the marked line. Now, sand to the line to finish shaping the front curved edge, being careful to keep the sander perpendicular to the particleboard. (We used a 150-grit sanding belt in our sander, allowing us to sand to the line gradually.)

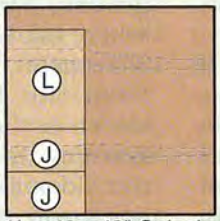
4 Mark the location of the stopped dadoes on the *bottom* surface of the desktop (A) where dimensioned on the Parts View drawing. Install a ¾" straight bit into a hand-held router, and adjust it to cut ⅛" deep. Cut a dado in a piece of scrap to verify that the mating piece of plywood will fit snugly in the dado. If the piece fits loosely, you'll have to switch to a ½" bit and rout the correct width of dado in two passes. Using a straightedge, rout a pair of ¾" dadoes ⅛" deep where marked. *Dadoes like this that do not go all*

Continued

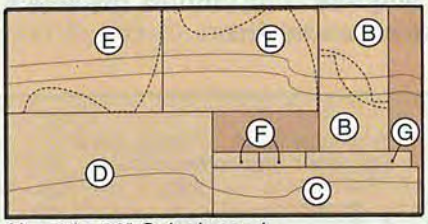
STUDY DESK

CUTTING DIAGRAM

3/4 x 48 x 48" Particleboard



1/4 x 48 x 48" Oak plywood



3/4 x 48 x 96" Oak plywood

1/2 x 7 1/4 x 96" Oak

Bill of Materials

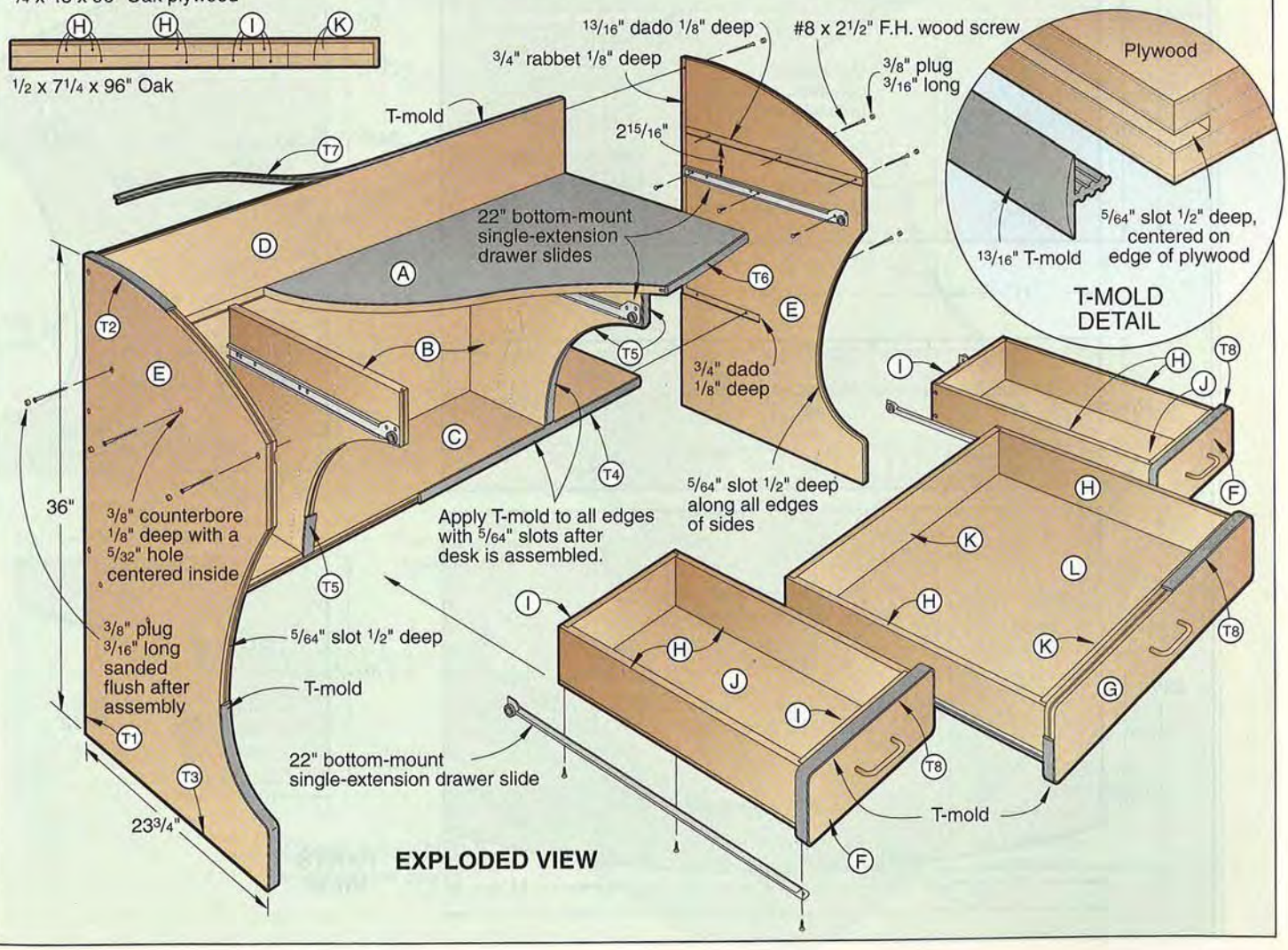
Part	Finished Size T	W	L	Matl.	Qty.
DESK CARCASE					
A* top	3/4"	26 1/8"	47 1/2"	PB	1
B braces	3/4"	22 1/8"	16 1/8"	OP	2
C shelf	3/4"	10 3/4"	47 1/2"	OP	1
D back	3/4"	23 3/4"	47 1/2"	OP	1
E sides	3/4"	23 3/4"	36"	OP	2
DRAWERS					
F false front	3/4"	3 5/8"	10 3/4"	OP	2
G false front	3/4"	3 5/8"	24 3/8"	OP	1
H sides	1/2"	3"	18"	O	6
I fronts & backs	1/2"	3"	9 1/8"	O	4

Part	Finished Size T	W	L	Matl.	Qty.
DRAWERS					
J bottoms	1/4"	9 7/8"	18"	OP	2
K front & back	1/2"	3"	22 1/4"	O	2
L bottom	1/4"	23"	18"	OP	1

*The top (A) is cut wider initially to allow sufficient room to lay out and cut the curved front edge.

Materials Key: PB–particleboard, OP–oak plywood, O–oak.

Supplies: 30x48" plastic laminate, contact cement, #6x3/4" flathead wood screws, #8x1" flathead wood screws, #8x1 1/2" flathead wood screws, #8x2 1/2" flathead wood screws, finish.



STUDY DESK

the way through are called "stopped" dadoes. Since the dadoes are cut on the bottom of the desktop (A), absolute accuracy in stopping the dadoes where marked is not crucial.

Cut the remaining pieces to size and shape

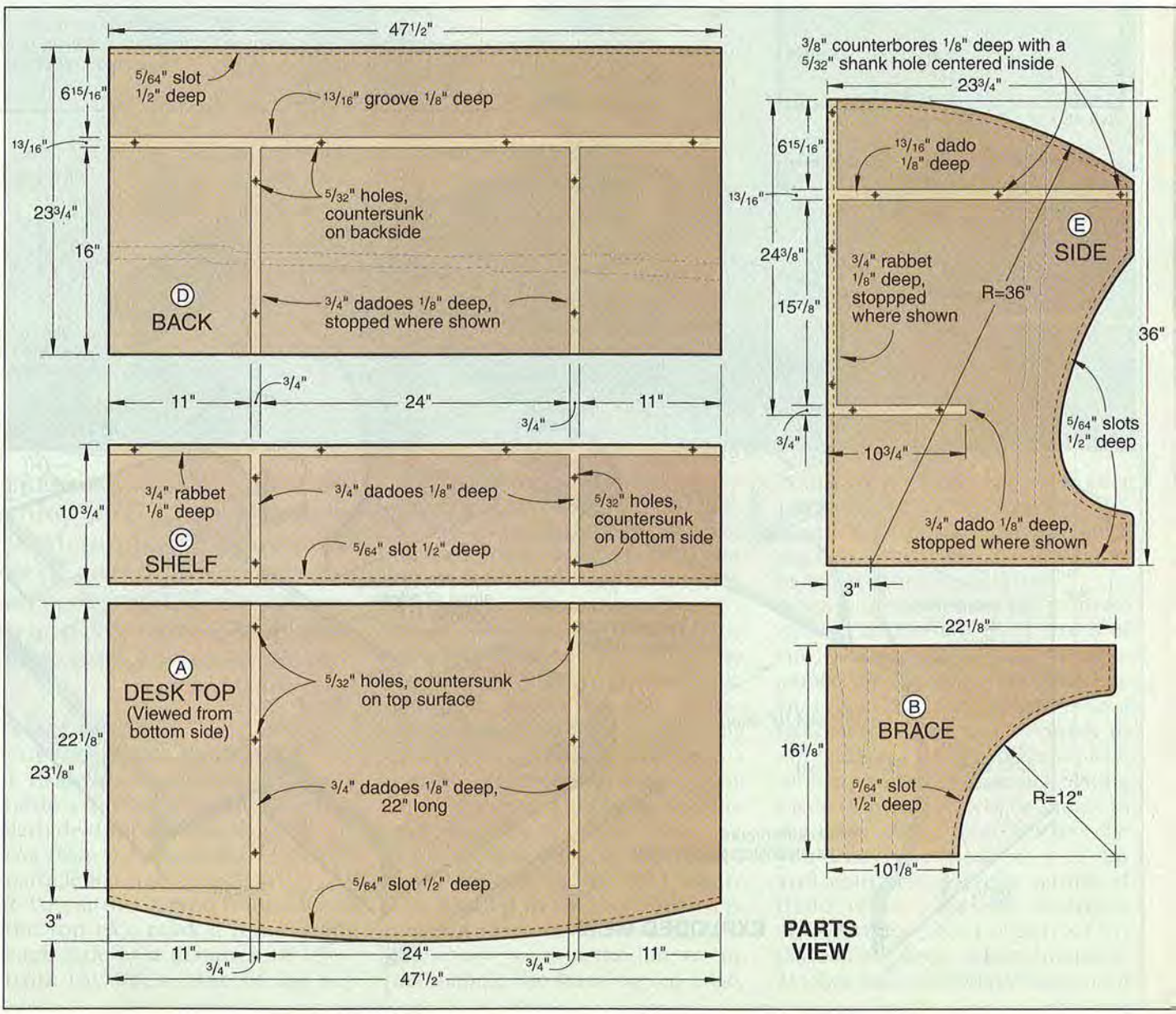
1 Cut the braces (B), shelf (C), back (D), and sides (E) to the sizes listed in the Bill of Materials from ¾" oak plywood.

2 Using the dimensions on the Parts View for reference, mark the cutlines, and cut and sand the braces (B) to shape.

3 Mark the location of the dadoes and rabbets on the shelf (C) where dimensioned on the Parts View drawing. Rout the dadoes and rabbets where marked, making certain that the dadoes in the shelf align with the dadoes on the bottom surface of the top (A).

4 Mark the location of the groove and dadoes on the inside face of the back (D). Form the dadoes *but not the groove*. Again, make certain that dadoes in the back align with the dadoes on the bottom surface of the top (A) and the top surface of the shelf (C). Since the groove will have to accommodate a plastic laminated top, it needs to be 13⁄16" wide. Before routing the groove, verify its location by dry-clamping the top (A), braces (B), and shelf (C) together. Then, hold the back (D) in place, and mark the exact location of the groove. Cut or rout the groove where marked.

5 Transfer the full-sized pattern from the *WOOD PATTERNS™* insert in the center of the magazine for the front-edge cutout in the sides (E) to a piece of scrap plywood measuring 9×32". Bandsaw and sand to the line to form a template.



6 Use trammel points to mark a 36" radius across the top edge of one side piece where shown on the Parts View drawing. Then, use the template to mark the curved cutout along the front edge. Cut and sand the top and front curves smooth. Use this side piece to mark the cutlines onto the second side-piece blank, and cut and sand it to shape.

7 Mark the locations, and cut the dadoes and rabbet on the *inside* surface of each side piece.

8 Chuck a 5/64" slot cutter into your hand-held router. Carefully position the bit to cut a slot *centered* along the edge of the plywood. Now, rout a slot in the braces (B), shelf (C), back (D), and sides (E) where shown on the Exploded View drawing and accompanying T-Mold detail. *Don't rout the slot in A yet; you'll do this after adding the plastic laminate.*

Finishing now makes for ease of assembly later

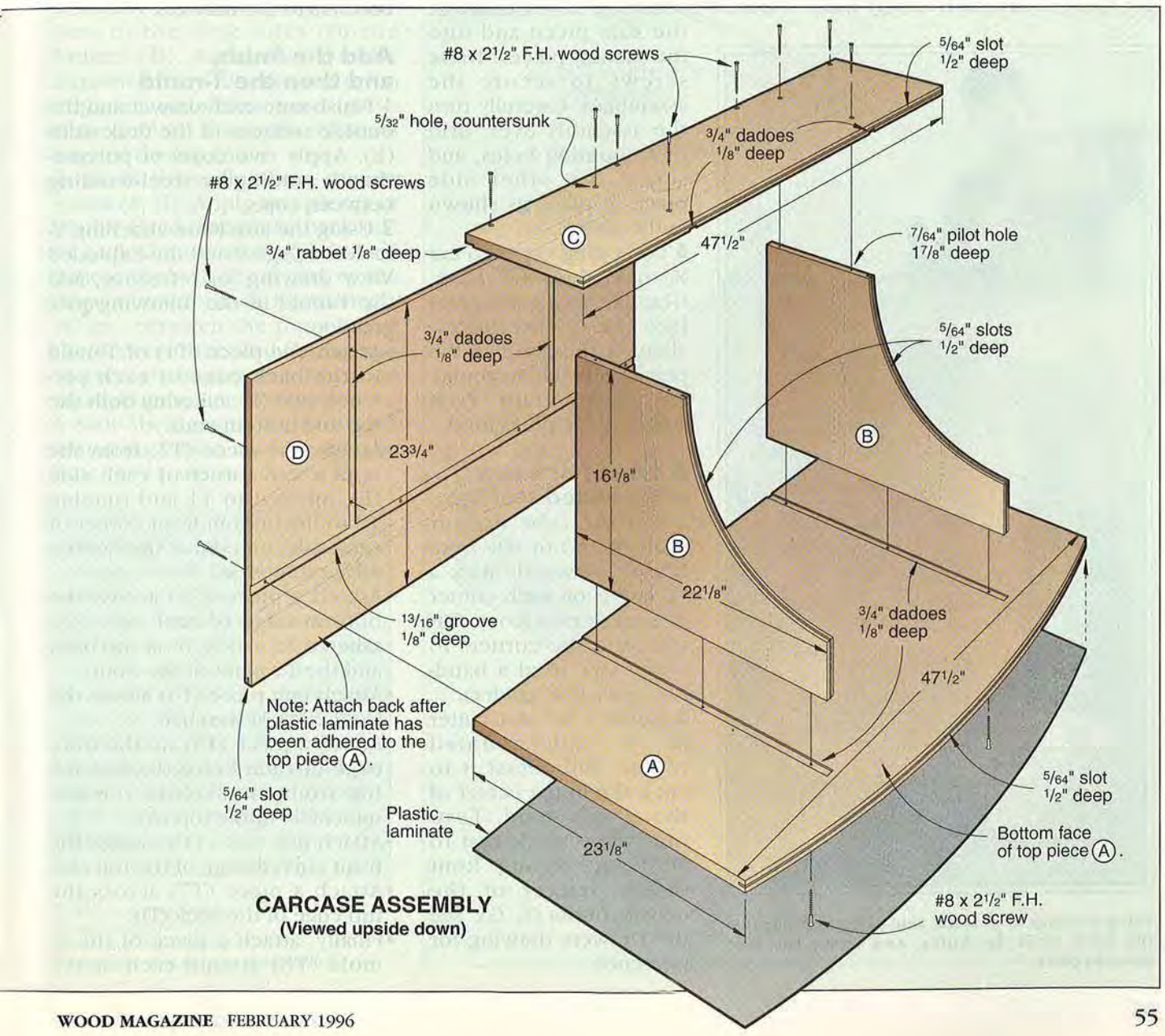
1 Finish-sand the braces, shelf, back, and sides.

2 Apply two coats of polyurethane to both sides of the braces (B), the shelf (C), the back (D), and to the *inside face* of the sides (E). You'll finish the outside face of the sides (E) after you've drilled and plugged the mounting holes. It is much easier to finish all these pieces before assembly, since they can be both varnished and rubbed out between coats as individual flat pieces.

Laminating and routing the desktop

1 Glue and clamp the braces (B) into the dadoes in the top (A), making certain that the backs of the braces are flush with the back edge of the top. Check for square. Drill countersunk pilot and shank

Continued



CARCASE ASSEMBLY
(Viewed upside down)

holes through the top (A) into the braces, and secure with wood screws. Make sure the screws don't protrude above the top surface of A; if so, they'll create bumps when adding the plastic laminate in the next step.

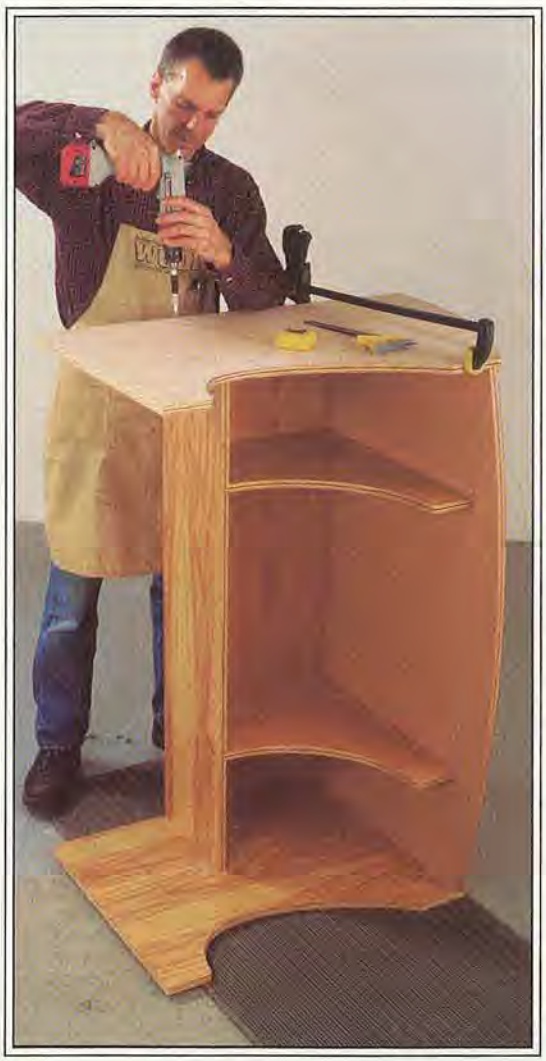
2 Adhere the plastic laminate to the top (A) with contact cement. Trim the laminate with a flush-trim bit. Do not bevel-trim the front edge; we'll cover the front edge with the T-mold later.

3 Chuck a 5/64" slot cutter into your hand-held router. Carefully position the bit to cut a slot *centered* along the front edge of the laminated top (A). Place the top/braces assembly (A/B) laminate side down on a pad on the workbench, and rout a slot in the front edge of the top (A) where shown on the Parts View drawing.

4 Clamp the shelf (C) to the top/braces assembly (A, B). Drill countersunk mounting holes through the shelf and into the braces. Drive the screws. Then, add the back (D) to the top/braces/shelf assembly in the same manner.

5 Place the carcase assembly (A,B,C,D) on end on a pad on the floor as shown in the photo *below left*. Position a side (E) in place, and use a clamp to draw the side tight to the back. Drill counterbored mounting holes through the side piece and into the mating pieces. Drive screws to secure the assemblies. Carefully turn the assembly over, drill the mounting holes, and screw the other side piece in place as shown in the photo.

6 Use a plug cutter to cut 3/8" oak plugs 3/16" long. Glue the face-grain plugs into the counterbores, aligning the grain of the plugs with the surrounding veneer grain. Trim and sand the plugs flush.



Using a clamp to pull the side piece tight against the back, drill the holes, and screw the side piece in place.

A trio of drawers add needed storage

1 Cut the false drawer fronts (F, G) to size from 3/4" oak plywood. Mark a 1/2" radius on each corner of each drawer front. Cut and sand the corners to shape (we used a bandsaw and a disc sander).

2 Install a 5/64" slot cutter in a table-mounted router, and adjust it to cut a slot in the center of the 3/4" plywood. Test-rout scrap stock first to verify the setting. Rout the perimeter of the drawer fronts (F, G). See the Drawers drawing for reference.

3 Mark the centerpoints and drill holes for adding the pulls later. Drill counterbores on the inside surface of the drawer fronts so the screw heads won't protrude.

4 From 1/2" stock (we used oak), cut the drawer sides (H) and fronts and backs (I, K) to size.

5 Cut or rout 1/2" rabbets 1/8" deep across both ends of each drawer side (H).

6 Clamp each of the three drawers together. Check for square. Drill countersunk mounting holes, and drive the screws.

7 Measure the drawers, and cut the 1/4" plywood bottoms (J, L) to size. Drill the holes and screw the bottoms to the drawers.

Add the finish, and then the T-mold

1 Finish-sand each drawer and the outside surfaces of the desk sides (E). Apply two coats of polyurethane, sanding or steel-wooling between coats.

2 Using the article on attaching T-mold on *page 4* and the Exploded View drawing for reference, add the T-mold in the following progression:

- Attach one piece (T1) of T-mold to the back edge of each plywood side (E), mitering both the top and bottom ends.
- Attach one piece (T2) from the upper rear corner of each side (E), mitered to T1 and running T2 to the bottom front corner of each side, mitered at the bottom edge of the side.
- Attach a piece (T3) across the bottom edge of each side (E), mitered to match T1 at the back and the T2 piece at the front.
- Attach one piece (T4) across the front edge of the shelf.
- Attach a piece (T5) up the front edge of each brace (B), extending from the shelf (C) to the underside of the top (A).
- Attach one piece (T6) across the front curved edge of the top (A).
- Attach a piece (T7) across the top edge of the back (D).
- Finally, attach a piece of the T-mold (T8) around each of the

drawer fronts (F, G), starting and ending at the bottom center of each drawer.

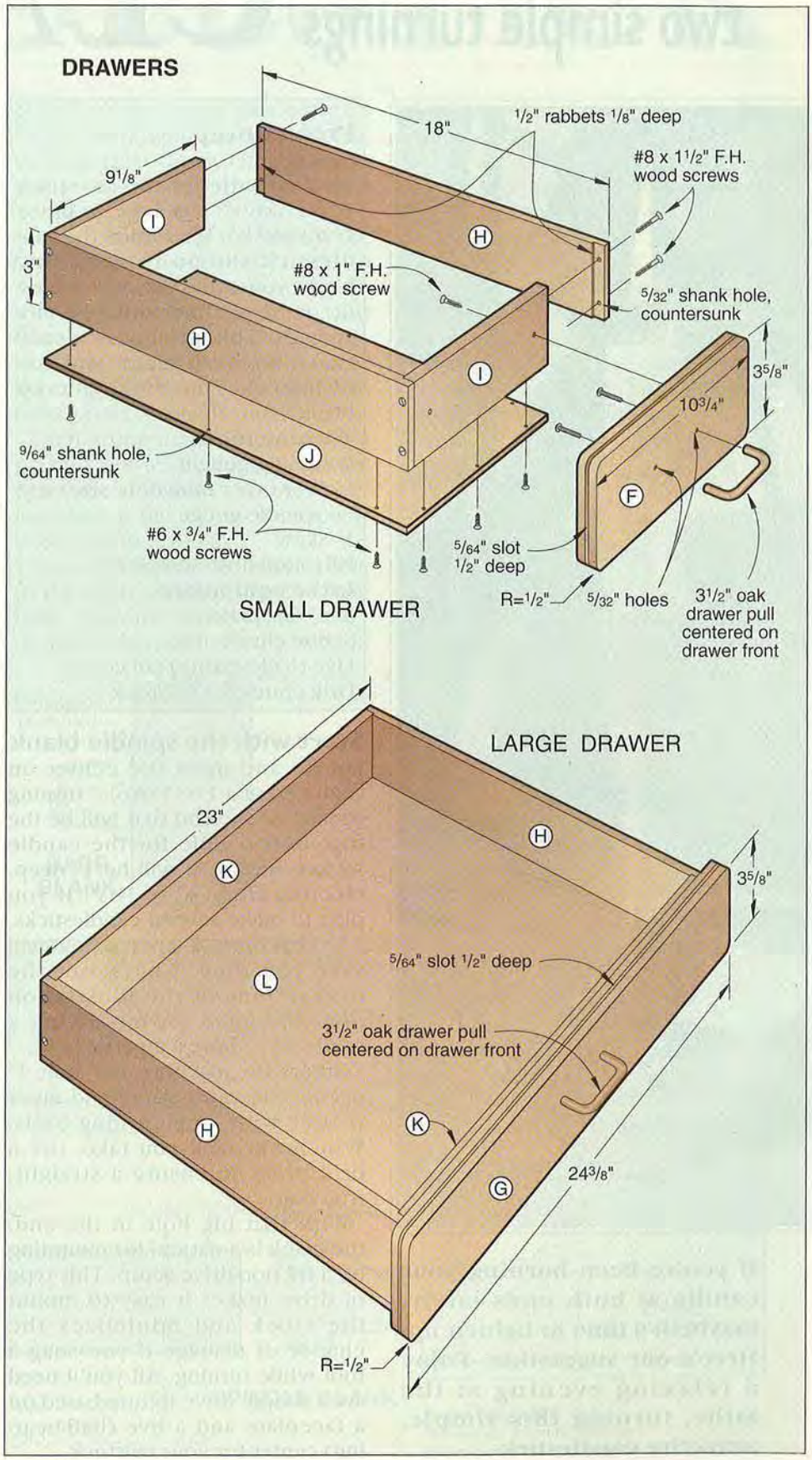
Install the drawers to complete your desk

1 Screw the drawer slides to the bottom side edge of each drawer. Make certain that the drawer slide is flush with the front of the drawer box. The 22" drawer slide will protrude beyond the back end of the drawer box. The drawers are made shorter than the full depth of the desk to accommodate computer wiring should you decide to use the desk for that purpose.

2 Mount the mating slide members to the desk sides (E) and braces (B). As shown on the Exploded View drawing, the top edge of our slides were positioned 2 15/16" from the bottom edge of the top (A).

3 Attach the pulls to the drawer fronts (F, G). Apply two pieces of double-faced tape to the back side of each drawer front (F, G) and adhere them to the fronts of the drawer box fronts (I, K), leaving a 1/8" gap between the top edge of the drawer fronts and the bottom surface of the top (A). Leave an equal spacing side-to-side.

4 Slide the drawers forward, drill mounting holes, and secure the Fs to the I parts and G to K.



Buying Guide

Study desk hardware. 50' of 13/16" bumper-style black plastic T-mold (#801-656); three pair of 22" bottom mount, single-extension drawer slides (878-204); three 3½" oak drawer pulls (825-576); 5/64" slot cutter (132-053). Woodworker's Supply, 1108 North Glenn Road, Casper, WY 82601. Or call 800/645-9292 to order.

Written by Marlen Kemmet
Project Design: Jan Hale Svec
Illustrations: Kim Downing
Photographs: King Au, John Hetherington

Colonial charm in two simple turnings

CLASSIC

If you've been burning your candle at both ends lately, maybe it's time to lighten up. Here's our suggestion: Enjoy a relaxing evening at the lathe, turning this simple, attractive candlestick.

Project prep

Stock

The spindle requires stock 1½×1½×6¼"; the base, a piece 1¼×3¼×3¼". We turned the candlestick shown from yellow birch; you could use any domestic or exotic hardwood, or mix species. This project is ideally suited for small scraps and cutoff pieces. You could glue up blanks, too.

Turning tools

Roughing gouge
3/16" (or other miniature size) and ½" spindle gouge
1" skew
½" round-nose scraper

Lathe equipment

3-4" faceplate
Screw chuck
Live (ball-bearing) tail center
Drill chuck for tailstock

Start with the spindle blank

Locate and mark the center on each end of a 1½×1½×6¼" turning square. At the end that will be the top, bore a hole for the candle socket. Ideally, it will be 1" deep, tapering from ⅞" to 13/16". If you plan to make several candlesticks, a bit that bores a tapered hole will save you time. Check out the instructions in the illustration *opposite page* for modifying a spade bit to bore a tapered hole.

Otherwise, just bore a ¾" hole 1" deep—you can enlarge and taper it later with your turning tools. Whichever tack you take, use a drill press to ensure a straight, true hole.

With that big hole in the end, the blank is a natural for mounting on a friction-drive setup. This type of drive makes it easy to mount the stock and minimizes the chance of damage if you snag a tool while turning. All you'll need are a simple drive fixture based on a faceplate and a live (ball-bearing) center for your tailstock.

Construct the drive fixture

Trace the outline of your 3-4" lathe faceplate on 1½"-thick stock. (Fir or pine 2× dimensional lumber works just fine.) Bandsaw the disc, and attach it to the faceplate with wood screws.

Turn the face of the disc flat and true. With a ½" gouge, bore 1" deep straight into the center of the disc. Enlarge the hole to accept a 1" dowel. Keep the side straight for a snug fit.

Glue a 2" length of 1" dowel into the hole, ensuring that it stands perpendicular to the disc's face. Turn the protruding dowel end to mate snugly with the hole in the spindle blank. Leaving a flat surface about 1½" in diameter around the dowel, turn the disc to approximately the form shown in the Spindle Blank illustration.

Turn the spindle

Mount the stock as shown in the Spindle Blank illustration. Round it to 1½" diameter, using a roughing gouge and 1" skew. If the workpiece stalls too readily as you cut, tighten the tailstock pressure to increase the drive friction. You also can place a leather or rubber washer or double-faced tape between the end of the stock and the drive face on the fixture to increase drive friction.

With a parting tool, cut in to the diameters indicated at four points on the Spindle Blank drawing. Hold a pencil point against the rotating blank 4¼" from its headstock end to locate the turning's major diameter.

Using those reference points and following the Full-Sized Spindle Half-Pattern, turn the spindle to shape. You can do most of the job with a ½" spindle gouge. A smaller gouge will come in handy for the small cove near the base. Cut the sharp vee right below the candle cup with a 1" skew or a parting tool laid sideways.

Print this article

CANDLESTICK

The base tenon will fit into a ½" hole in the base, so size it accurately and keep the sides straight for a good fit. Sand the spindle with 120- and 220-grit sandpaper. For a finer surface, sand the spindle with the grain—the lathe not running—with 320-grit paper. Apply the finish of your choice, but not to the tenon nor the face around it.

Shape the base

Turn the small base easily, using a screw chuck. To mount the stock, first measure the length of the screw protruding from the face of the chuck (ours is just shy of ¾"). Then, glue a 3¼×3¼" scrapwood waste block a little thicker than the screw's length to the back of the 1¼×3¼×3¼" base stock.

Draw diagonal lines on the waste block to locate the center. Scribe a 3¼" circle around the center. Then, drill a pilot hole for the screw straight into the center point. Bandsaw the circle. Attach the screw chuck to the waste block and workpiece.

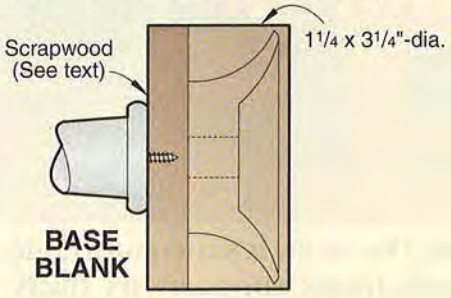
Referring to the Base Blank drawing and the Full-Sized Base Half-Pattern, turn the base to shape. Start with the side profile, cutting into the waste block as you form the side curve with your ½" spindle gouge.

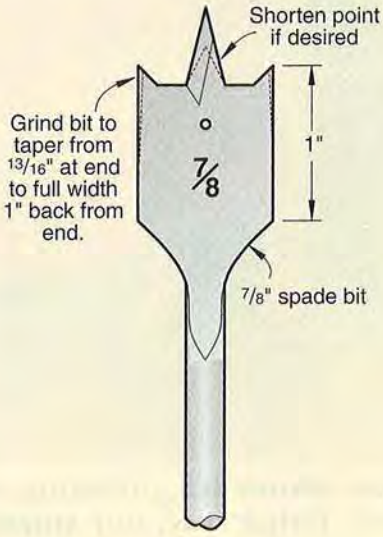
Before hollowing the top of the base cup, bore a ½" hole to receive the spindle tenon. To do this, install a drill chuck on your lathe's tailstock, and chuck a ½" bit in it. (A flat-bottomed hole bored by a Forstner bit would be ideal.) Go 1⅛" deep.

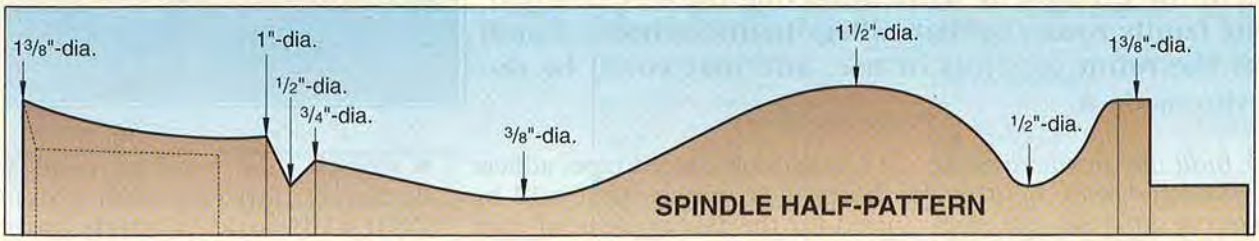
Then, using the hole as a starting point, hollow the top. Blend the upswept side into the base, but maintain a flat center surface at least 1⁵⁄₁₆" in diameter.

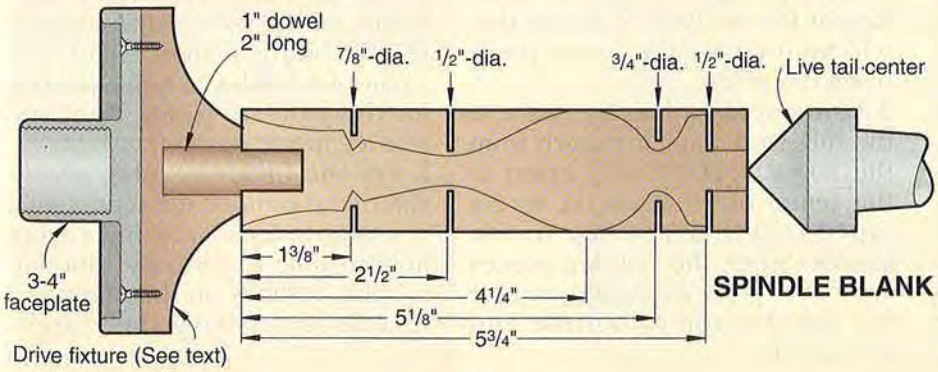
Sand and finish the base. Then, fit the spindle tenon into the base hole. Trim the tenon if necessary to make the spindle seat firmly on the base. Glue the spindle into the base, using the tail center to align it and clamp it.

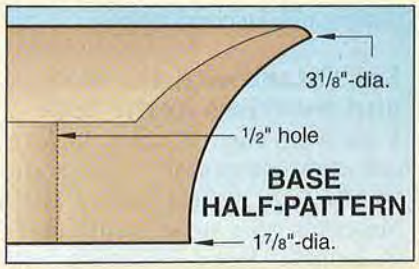
After the glue dries, enlarge and taper the candle hole with a small round-nose scraper. With the gouge, cut the top of the candle cup at an angle where shown. Support the workpiece with your hand for both operations, if necessary. Then, part the candlestick from the faceplate. Finally, sand and finish the bottom.





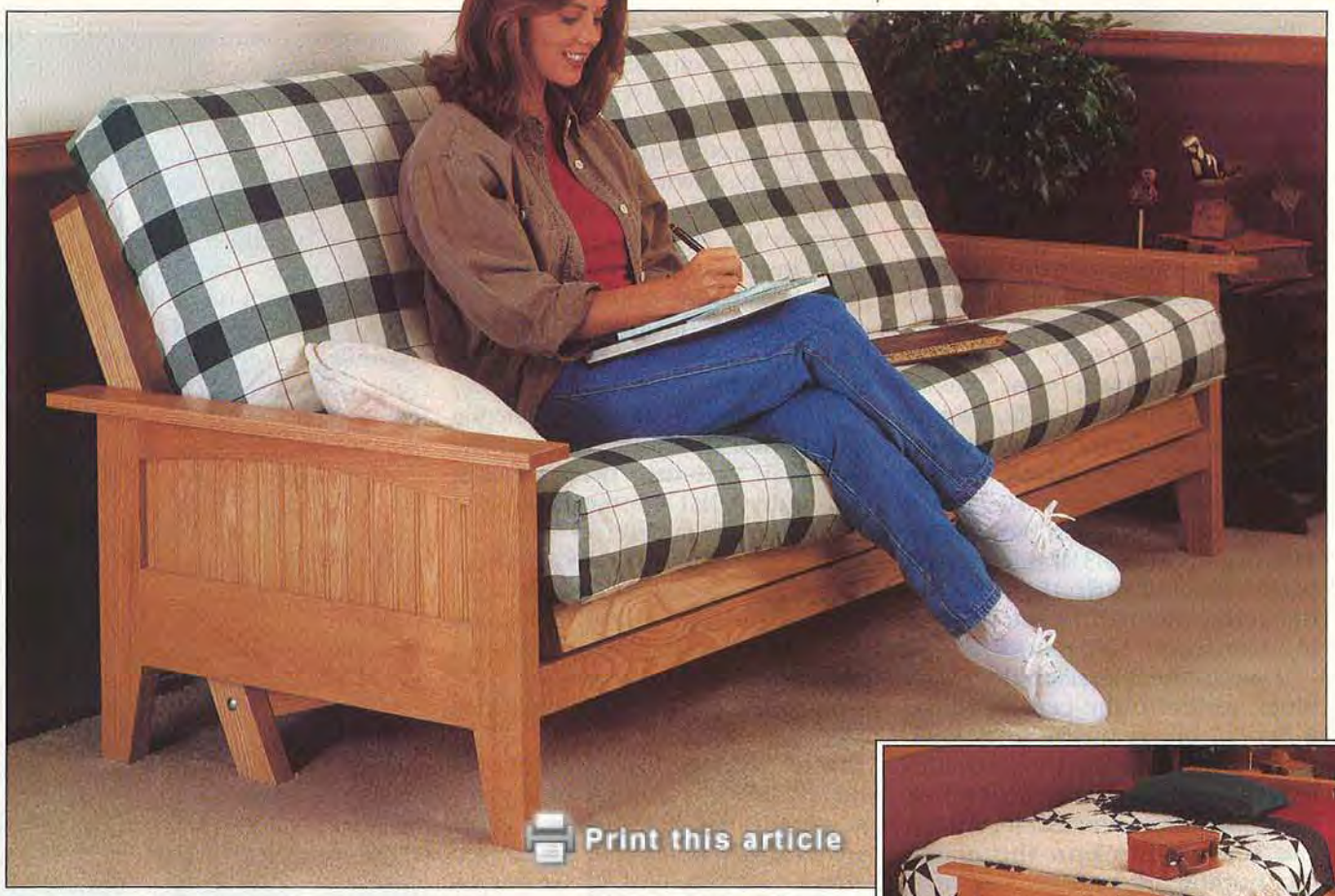






Project Design: M.V. Tucker
Illustrations: Roxanne LeMoine
Photograph: John Hetherington

FANTASTIC FUTON



One minute it's a relaxing sofa. The next, it's a comfortable bed. Either way, our sturdy oak frame supports its fluffy mattress in the greatest of style. Build one for an extra bedroom, the family room, or that college-bound scholar. You'll find that the futon gets lots of use, and that you'll be the genius who made it.

Note: We built our frame around a 54×75" full-sized futon mattress. If you select a different size mattress, you'll need to adjust the frame size accordingly.

Let's start with the slots and mortises in the legs

1 To form the 1½"-thick legs (A), cut eight pieces of ¾"-thick stock to the size listed in the Bill of Materials *plus* ⅛" in width and ¼" in length. (Since 1½"-thick oak is difficult to find, we laminated two pieces of ¾" stock to form the 1½"-thick pieces.)

2 Using double-faced tape, adhere the two ¾" pieces that will be used for the *inside* piece of each front leg together face-to-face. Repeat for the two ¾" pieces that will be used for the *inside* piece of each rear leg.

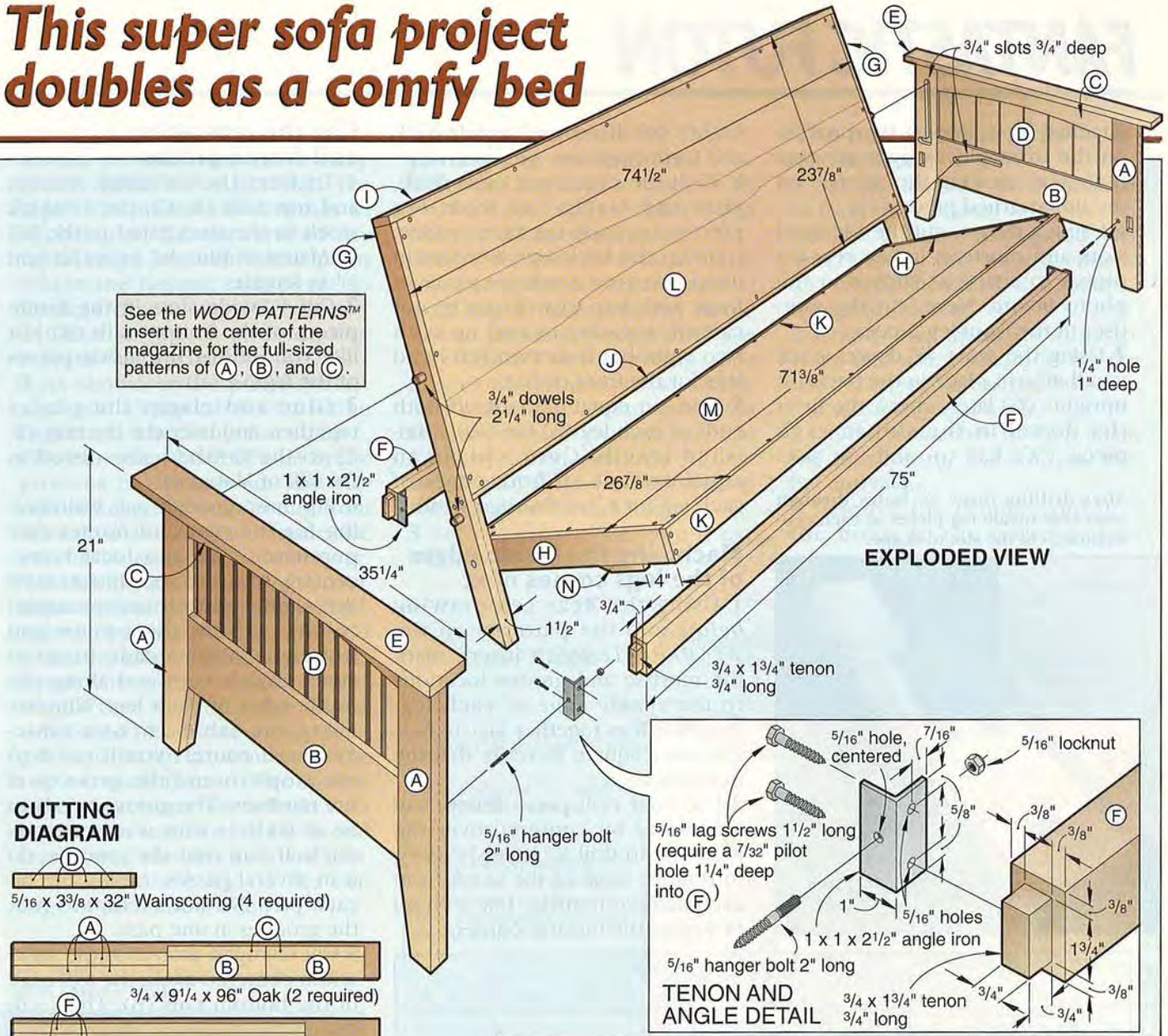
3 Using spray adhesive, adhere the full-sized rear-leg pattern from the *WOOD PATTERNS™* insert in the center of the magazine to the taped-together rear-leg inside pieces. Since the rear-leg pieces are cut slightly oversized, center the pattern top-to-bottom and side-to-side.

4 Chuck a ¾" bit (we used a Forstner) into your drill press. Drill a ¾" hole through both pieces at each of the three center-points on the L-shaped slot where marked on the pattern. Then, drill a pair of ¾" holes to hog-out stock for the mortises in the front and rear leg inside pieces.

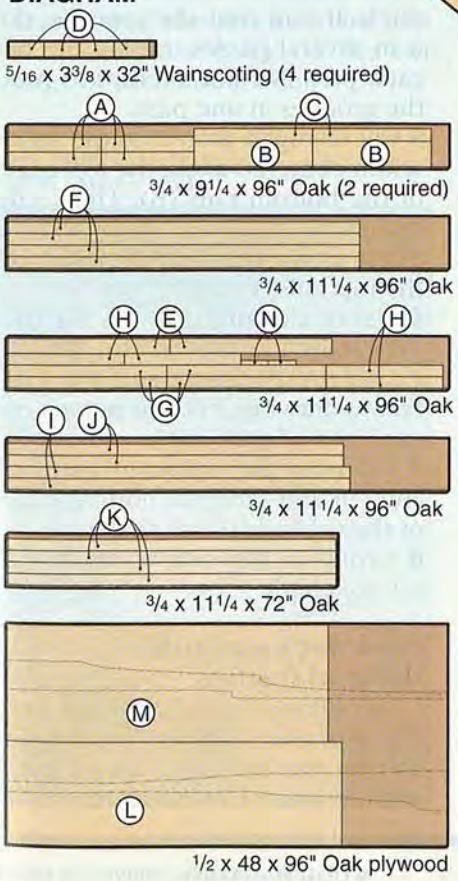
5 Pry the inside rear-leg pieces apart, and remove the tape. Using a straightedge, mark lines from hole to hole to form the slot and mortise outlines on the one piece that does not have the pattern

Continued

This super sofa project doubles as a comfy bed



CUTTING DIAGRAM


5/16 x 3⅜ x 32" Wainscoting (4 required)
3/4 x 9¼ x 96" Oak (2 required)
3/4 x 11¼ x 96" Oak
3/4 x 11¼ x 96" Oak
3/4 x 11¼ x 96" Oak
3/4 x 11¼ x 72" Oak
½ x 48 x 96" Oak plywood

Bill of Materials

Part	Finished Size T	W	L	Matl.	Qty.
END FRAMES					
A* legs	1½"	3¼"	20¼"	LO	4
B* bottom rails	1½"	5½"	25¾"	LO	2
C* top rails	1½"	2¾"	25¾"	LO	2
D wainscoting	5/16"	3⅜"	7⅞"	OW	16
E armrests	¾"	3¼"	35¼"	O	2
RAILS					
F* front& rear rails	1½"	2½"	76½"	LO	2
BACKREST AND SEAT					
G* backrest upright	1½"	2½"	34⅝"	LO	2
H* seat ends	1½"	2½"	25⅜"	LO	2
I* backrest top crossmbr.	1½"	2½"	74½"	LO	1

Part	Finished Size T	W	L	Matl.	Qty.
BACKREST AND SEAT					
J* crossmbr.	1½"	2½"	73"	LO	1
K* seat crossmbr.	1½"	2½"	71⅜"	LO	2
L backrest panel	½"	22⅜"	73"	OP	1
M seat panel	½"	25⅜"	69⅞"	OP	1
N stops	¾"	1½"	6"	O	2

*Initially cut parts marked with an * oversized. Trim to finished size according to the instructions.

Materials Key: LO–laminated oak, OW–oak wainscoting, O–oak, OP–oak plywood.

Supplies: #8×1", #8×1½", and #8×2" flathead wood screws; 4–5/16" hanger bolts 2" long, 2–5/16" carriage bolts 3½" long; 5/16" washers; 8–5/16" locknuts; 8–5/16" lag screws 1½" long; ¾" hardwood dowel; 4–1×1×2½" angle iron; clear finish.

attached to it. Repeat the process on the front pieces by separating them and marking the mortise on the unpatterned piece.

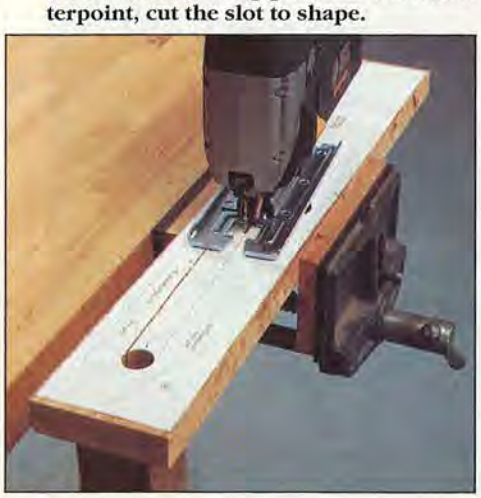
6 Using a jigsaw, cut the L-shaped slots and mortises in the rear-leg pieces to shape as shown in the photo *below*. Next, cut the mortises in the front-leg pieces.

7 Using the same ¾" dowel stock you'll glue in place in the backrest uprights (G) later, check the fit of the dowel in the slot in each piece. (We had to sand our slots slightly for the dowel to slide back and forth easily.)

8 With the edges and ends flush, glue and clamp the front leg pieces for each leg face-to-face. Glue up the back legs, keeping in mind you need a matching pair of front and rear legs. If you're not careful, it's easy to end up with two right-hand or two left-hand legs for the front or back.

9 Trim an equal amount off both ends of each leg (A) for a 20¼" finished length. Cut or plane an equal amount off both edges of each leg for a 3¼" finished width.

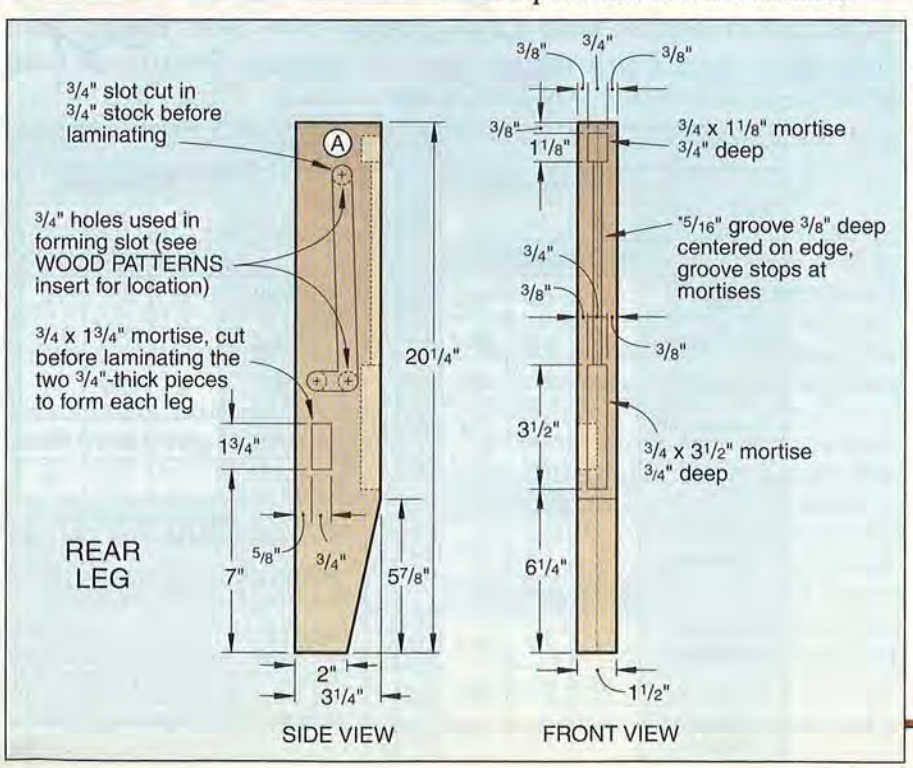
After drilling three ¾" holes through both rear inside leg pieces at each centerpoint, cut the slot to shape.



Machining the inside edges of the legs comes next

1 Using the Rear Leg drawing *below* and the patterns on the *WOOD PATTERNS™* insert, mark the mortise and groove locations to the *inside edge* of each leg. Hold the legs together face-to-face and use a square to verify that the mortises align.

2 Use your drill press, fence, and a Forstner bit centered over the joint line to drill ¾" holes ¾" deep to remove most of the stock from each marked mortise. Use a chisel to square the mortise corners.



Cut the remaining end-frame pieces

1 To form the 1½"-thick bottom and top rails (B, C), cut ¾"-thick stock to the sizes listed in the Bill of Materials plus ⅛" in width and ¼" in length.

2 Cut ¾"-wide slots in the inside pieces of the bottom rails (B) just like you did for the inside pieces of the legs.

3 Glue and clamp the pieces together, and later cut the rails (B, C) to the finished sizes listed in the Bill of Materials.

4 Purchase enough oak wainscoting for the two end frames (we purchased ours at a local home-center). Measure the thickness of the wainscoting (ours measured 5/16"-thick). Now, use a router and a straight bit or a dado blade to cut a groove centered along the inside edge of each leg. Whether using the tablesaw or a table-mounted router, you'll need to use stops to end the grooves at the mortises. The groove needs to be as wide as your wainscoting is thick. If you rout the grooves, do it in several passes, raising the bit each pass. Do not attempt to rout the grooves in one pass.

5 Cut or rout a groove to the same width centered along the *top* edge of the bottom rails (B). Then, cut the same width of groove 1¼" deep along the *bottom* edge of the top rails (C).

6 Using the dimensions on the Top Rails Pattern on the *WOOD PATTERNS™* insert and the End Frame drawing, cut the tenons on each end of each rail.

7 Transfer the full-sized pattern, and cut and sand the bottom edge of the top rails (C) to shape.

8 Crosscut the oak wainscoting (D) to length.

Now, let's assemble the end frames

1 Dry-clamp (no glue) each end frame to check the fit. You'll need to trim the outside edge of each outside piece of wainscoting. The

outside edges of the wainscoting should protrude into the 3/8"-deep groove about 5/16". Also, mark the taper-cutline on the bottom of each leg so the top end of the taper stops just below the point where the bottom rail (B) meets the leg (A).

2 Cut the tapers and sand to remove the saw marks.

3 As shown in the photo *below*, glue and clamp each end frame together, checking for square. (We ran a thin bead of glue in the grooves in the bottom and top rails to keep the wainscoting from rattling in the finished frame. Be careful to minimize squeeze-out. We did not glue the tongue-and-groove joints between the individual wainscoting pieces.) Wipe off all excess glue with a damp cloth.

4 Cut the armrests (E) to size. Check that the top edge of the assembled end frame is flat, then glue and clamp an armrest to the top of each frame. The inside edge of each armrest is flush with the inside surface of each end frame, and the armrests are centered front to back on the top edge of each end frame.

Glue and clamp each end frame together. Immediately wipe off excess glue with a damp cloth.

Cut a pair of rails for joining the end panels

1 Cut and laminate 3/4"-thick stock for the front and rear rails (F) just like you did for the legs (A).

2 Trim the rails to finished size, and cut a tenon on each end of each rail to the size shown on the Tenon detail accompanying the Exploded View drawing. *For proper clearance of the assembled seat and backrest assemblies between the end frames, keep the distance between the tenon shoulders 75" as dimensioned on the Exploded View drawing.*

3 Set the rails aside; you'll use them to join the end frames later.

The backrest uprights come next

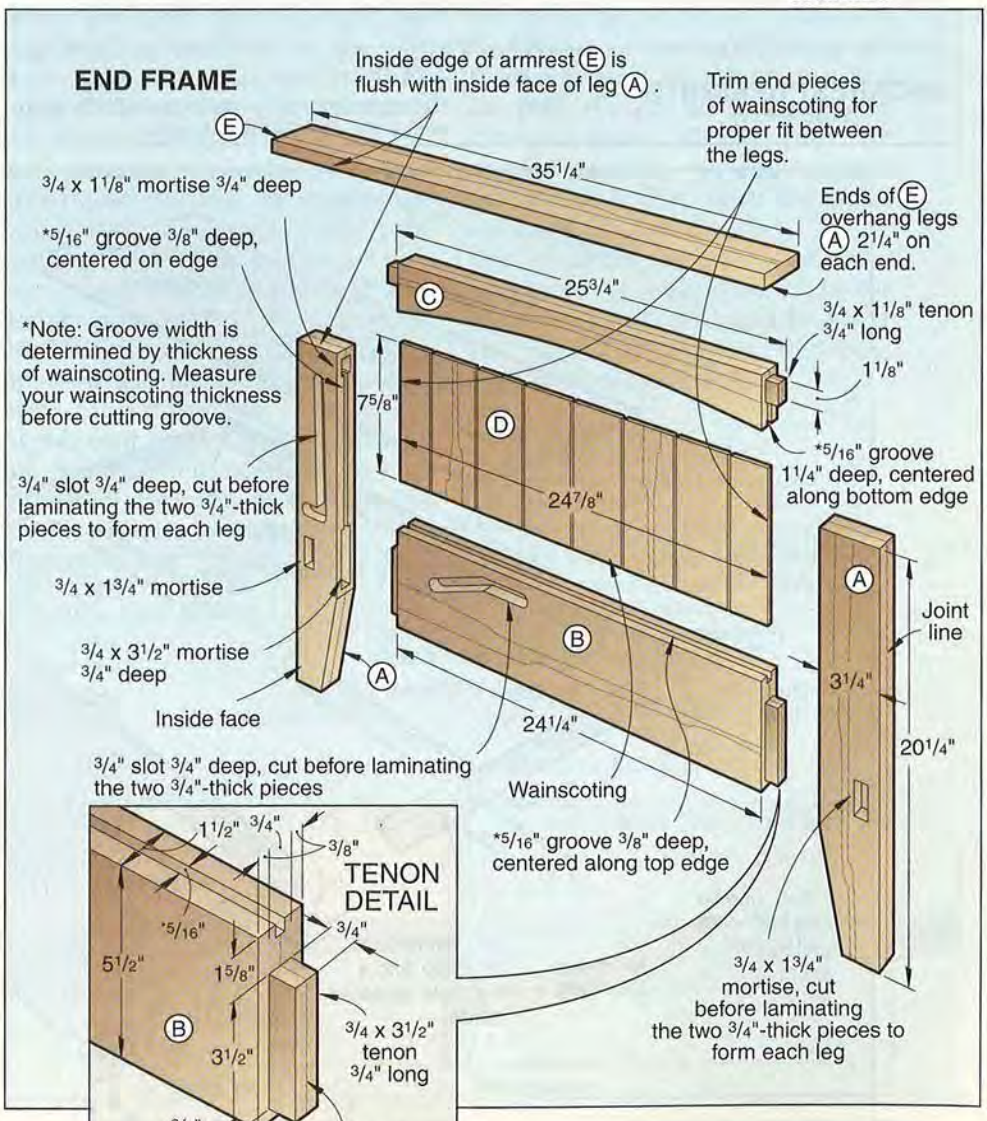
1 Cut and laminate 3/4"-thick stock to form the backrest uprights (G). Cut the uprights to finished size, miter-cutting the bottom ends at 25° where shown on the Backrest Uprights drawing.

2 Clamp the uprights edge-to-edge, and use a square to lay out the centerpoints for the holes on the *outside* face of each.

3 On the *inside* face of each, mark the location for the stopped rabbet and dado.

4 Remove the clamps, and drill the holes to the correct sizes where marked.

Continued


END FRAME
Inside edge of armrest (E) is flush with inside face of leg (A).
Trim end pieces of wainscoting for proper fit between the legs.
(E)
35 1/4"
3/4 x 1 1/8" mortise 3/4" deep
*5/16" groove 3/8" deep, centered on edge
Ends of (E) overhang legs (A) 2 1/4" on each end.
(C)
25 3/4"
3/4 x 1 1/8" tenon 3/4" long
1 1/8"
*Note: Groove width is determined by thickness of wainscoting. Measure your wainscoting thickness before cutting groove.
7 5/8"
(D)
*5/16" groove 1 1/4" deep, centered along bottom edge
3/4" slot 3/4" deep, cut before laminating the two 3/4"-thick pieces to form each leg
24 7/8"
3/4 x 1 3/4" mortise
(A)
Joint line
3/4 x 3 1/2" mortise 3/4" deep
(B)
3 1/4"
Inside face
(A)
24 1/4"
20 1/4"
3/4" slot 3/4" deep, cut before laminating the two 3/4"-thick pieces
Wainscoting
*5/16" groove 3/8" deep, centered along top edge
TENON DETAIL
1 1/2"
3/4"
3/8"
*5/16"
3/4"
5 1/2"
1 5/8"
(B)
3/4 x 3 1/2" tenon 3/4" long
3 1/2"
3/8"
Joint line
3/4 x 1 3/4" mortise, cut before laminating the two 3/4"-thick pieces to form each leg

FANTASTIC FUTON

5 Cut the 1½" dado ¾" deep in each where marked. (We did this on a tablesaw fitted with a dado blade.) Then, cut the ½" rabbet ¾" deep where marked (we did this on a table-mounted router fit with a straight bit).

Cut the pieces and assemble the seat and backrest

1 Cut and laminate ¾"-thick stock to form the 1½"-thick seat ends (H), backrest bottom and top crossmembers (I, J), and seat crossmembers (K).

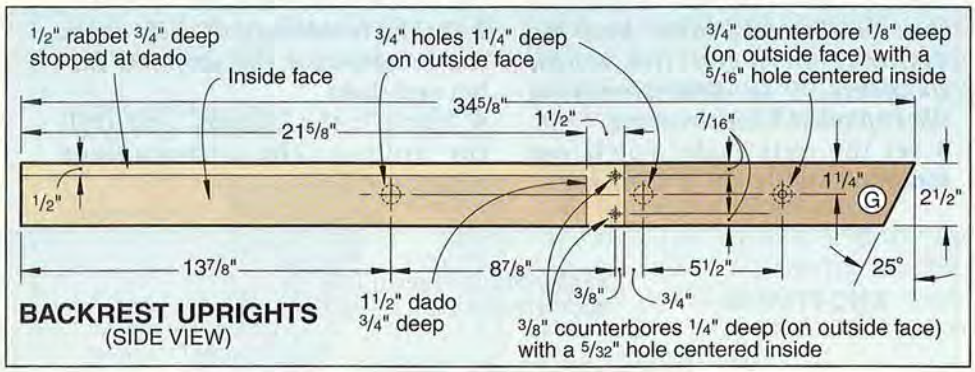
2 Cut the pieces (H, I, J, K) to the finished sizes listed in the Bill of Materials. *For a proper fit of the seat and backrest assemblies between the end frames, be careful to cut crossmembers I, J, and K to the exact lengths listed in the Bill of Materials.*

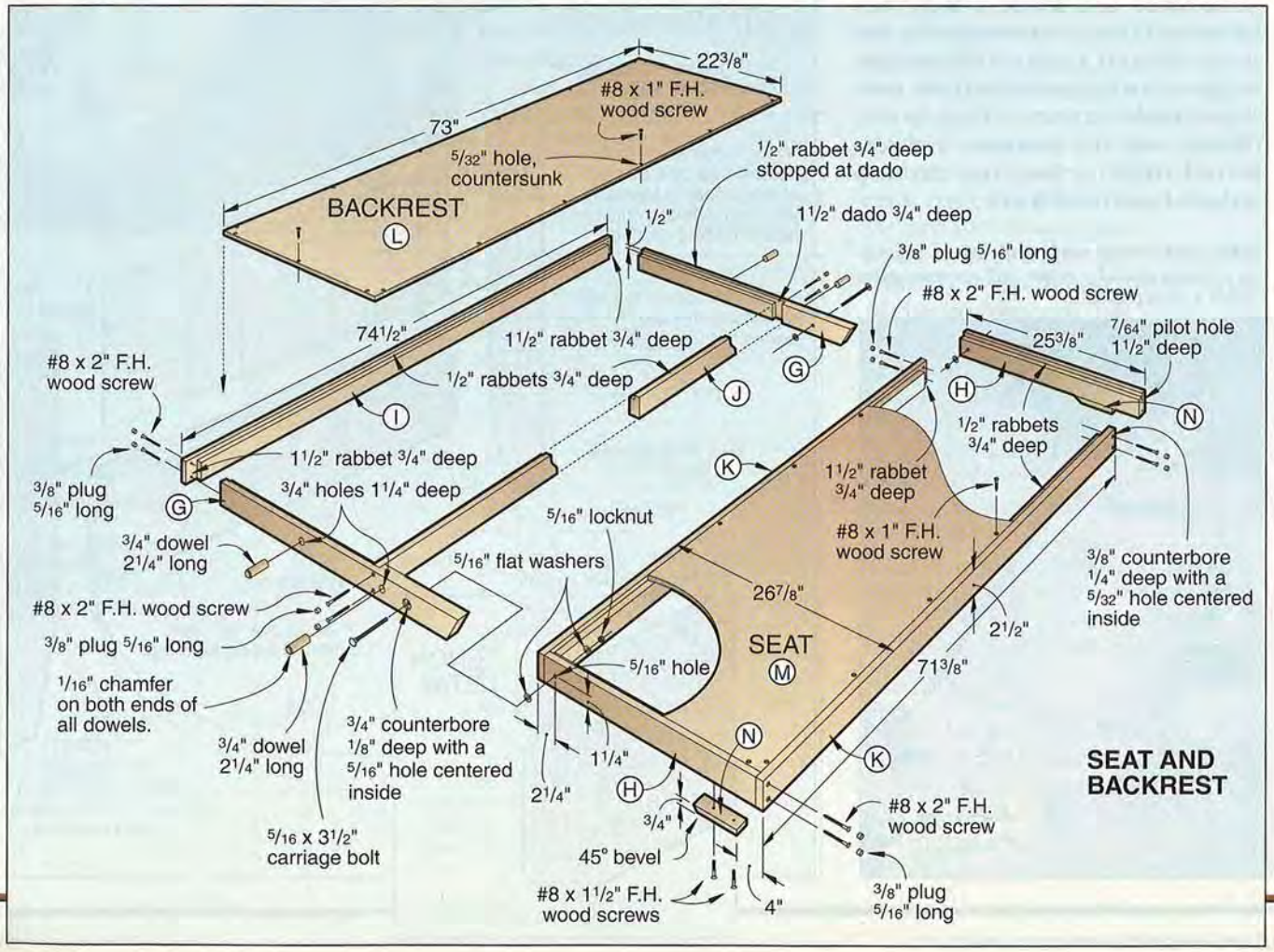
3 Cut a rabbet across each end of parts I and K where dimensioned on the Seat and Backrest drawing.

4 Measure the *exact* thickness of the ½" AB plywood that you'll use for the backrest and seat panels (L, M). (To keep the overall weight down, we used ½" stock for the panels. If you have trouble finding this thickness of sheet goods, you may have to use ¾"-thick stock.)

5 Cut a rabbet along the top edges of parts H, I, J, and K where dimensioned on the Seat and Backrest drawing.

6 Glue and screw the backrest frame (G, I, J) together, checking for square. Measure the opening, and cut the backrest panel (L) to fit. Set it in place. *Check for square again. For bind-free movement of the backrest and seat assemblies between the end frames later, each assembly must be square.* Drill countersunk





mounting holes, and glue and screw the backrest panel in place.

7 Repeat the process just described to glue, clamp, and screw together the seat assembly (H, K, M).

8 Use a plug cutter to cut sixteen ⅜" plugs 5/16" long. Glue a plug into each counterbore. Later, sand the plugs flush.

9 Position the seat assembly between the miter-cut ends of the backrest uprights (G). Use the previously drilled holes in the uprights as guides to drill mating 5/16" holes in the seat ends (H), 2¼" in from the ends where dimensioned on the Seat and Backrest drawing at *left*.

It's time to add the finish, assemble, and relax

1 Finish-sand the end frames, rails, backrest, and seat.

2 Crosscut four pieces of ¾" dowel to 2¼" long. Sand a slight chamfer on each end, and glue them in place in the backrest where shown on the drawing.

3 Apply a clear finish to all parts. (We used a semi-gloss lacquer.)

4 Use a pair of 5/16" carriage bolts 3½" long with flat washers and locknuts to connect the backrest to the seat assembly.

5 Using the Tenon detail accompanying the Exploded View drawing, cut four pieces of 1" angle iron to 2½" long. Drill three holes in each where shown on the detail. Sand or file the pieces to remove the burrs.

6 Drill mounting holes, and screw an angle-iron brace to the ends of each rail (F).

7 Position one end frame inside face up on your workbench or on a blanket on the floor, depending on the available clearance from the floor to the ceiling. Now, set the rails (F) in their mating mortises. Using the angle-iron braces as guides, mark the location of the hanger-bolt hole on each leg (A). Remove the rails, and drill the hanger-bolt mounting holes where marked. Repeat this step to mark and drill the holes in the opposite end frame.

8 Double-nut four 5/16" hanger bolts 2" long, and thread them into their mating holes in the legs.

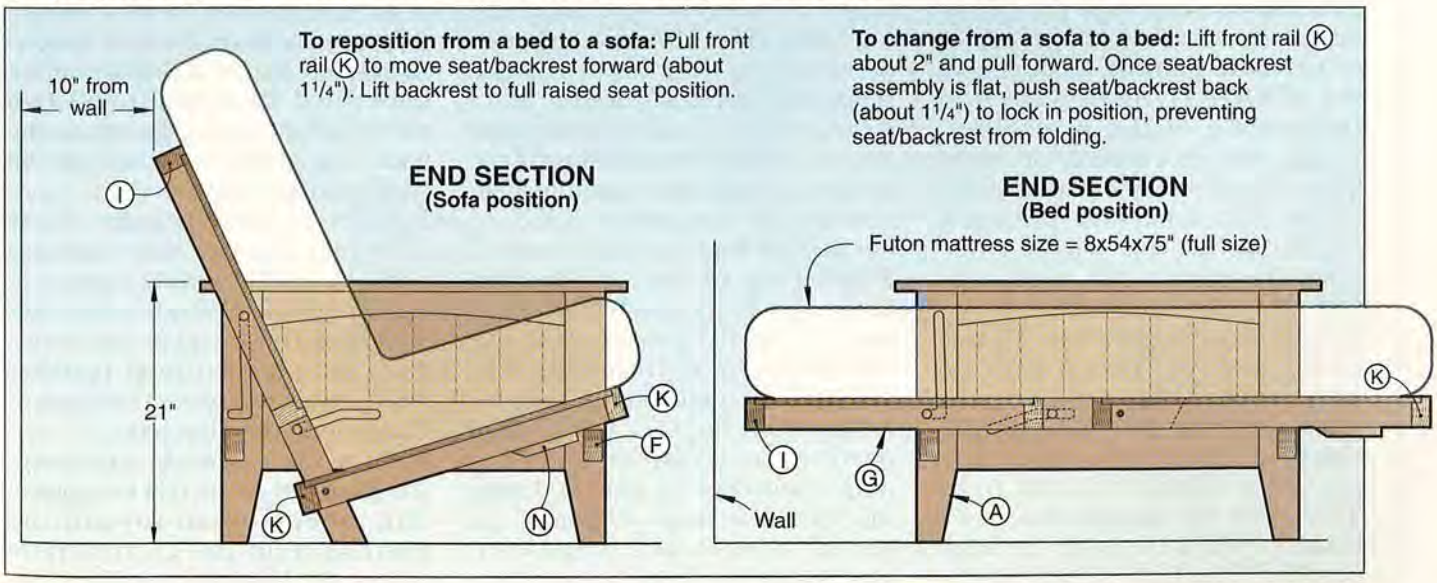
9 Fit (no glue) the rails (F) to *one* end frame, sliding the angle-iron brace onto the hanger bolts protruding from each end-frame leg. Secure the braces to the legs and hanger bolts with a 5/16" locknuts.

10 With the assistance of a helper, position the backrest/seat assemblies face down on your workbench (we used a pad to protect the finish). Then, position the end frame/rail assembly so the dowels in the backrest fit into the slots in the end frame. Now, position the opposite end frame in place. Thread the locknuts onto the hanger bolts to secure the second end frame to the assembly.

11 To prevent fingers from getting pinched when raising and leveling the seat and backrest assembly, cut a pair of stops (N) to size. Drill a pair of countersunk mounting holes in each, sand, finish, and screw one stop to the bottom edge of each seat end (H), 4" from the front edge of K where shown on the Exploded View drawing.

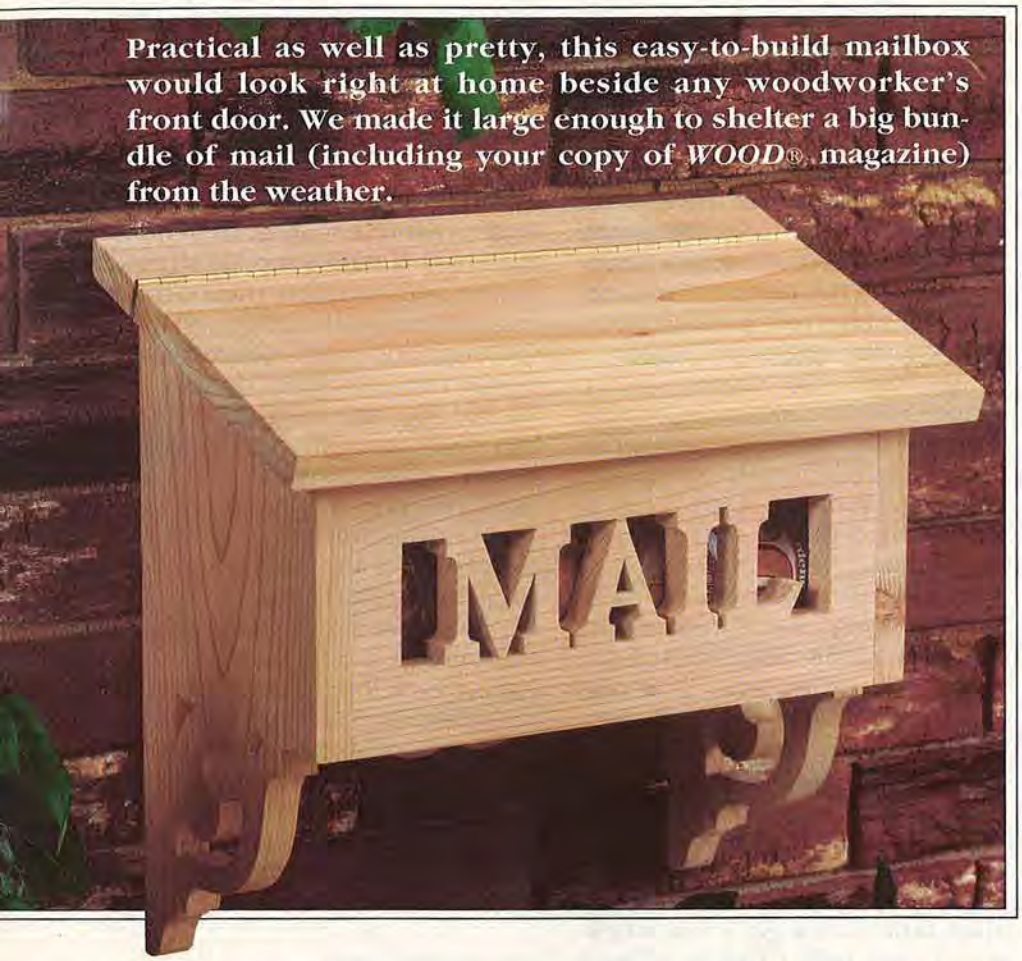
12 For seating, position the seat and backrest in the configuration shown on the End Section (Sofa position) drawing *below left*. In the seating position, keep the back edge of the futon frame 10" from the wall for clearance. For sleeping, simply lift the front seat crossmember (K) and pull forward. Once the seat and backrest assemblies lie flat, push the entire assembly backwards about 1½" so the dowels in the backrest uprights (G) lock in place in the grooves in the rear legs (A) where shown in End Section (Bed position) drawing *below*.

Written by Marlen Kemmet
Project Design: James R. Downing
Illustrations: Kim Downing; Lorna Johnson
Photographs: King Au


To reposition from a bed to a sofa: Pull front rail (K) to move seat/backrest forward (about 1¼"). Lift backrest to full raised seat position.
To change from a sofa to a bed: Lift front rail (K) about 2" and pull forward. Once seat/backrest assembly is flat, push seat/backrest back (about 1¼") to lock in position, preventing seat/backrest from folding.
10" from wall
END SECTION (Sofa position)
END SECTION (Bed position)
Futon mattress size = 8x54x75" (full size)
21"
Wall

A great wooden cache for the day's post

FIRST-CLASS



Practical as well as pretty, this easy-to-build mailbox would look right at home beside any woodworker's front door. We made it large enough to shelter a big bundle of mail (including your copy of *WOOD*® magazine) from the weather.

Cut out the pieces

1 Cut the two sides (A) to the dimensions shown in the Bill of Materials. Make two photocopies of the Side pattern. (They're in the *WOOD PATTERNS™* insert in the middle of the magazine.) Using rubber cement or spray adhesive, adhere one pattern copy to the right-hand side, placing it on the surface that will face out. Stick the pattern on the inside face of the left-hand side.

2 Set your tablesaw's miter gauge to 20°, and saw the top angle on each piece. Then, scrollsaw the ornamental bottom brackets. Drill the blade start holes, and complete the inside cutouts first. Then, saw the outside line. A #7 blade (.043×.016" with 12 teeth per inch) cuts the ¾" cedar nicely.

3 Cut a ¾×9¼×15½" piece of stock for the lid (B) and top (C). Saw a 20° bevel on one edge. Rip a 2" strip from the beveled edge to make the top, then rip the remaining piece to 7" for the lid.

4 Cut parts D, E, and F to the sizes shown. When crosscutting these parts to length, use a miter-gauge extension and stopblock to ensure that they're all the same.

5 Referring to the Side Section View and Exploded View drawings, saw a 20° bevel on the top edge of the back (D) and front (F) to match the angle on the sides.

6 Photocopy the Back Lower Edge pattern, and adhere it to the unbeveled edge of part D. Using the scrollsaw and a #7 blade, cut out the three inside areas, then saw along the outside pattern line.

7 Photocopy the Front Cutout pattern. Center it on the narrow face of part F, with the top adjacent to the beveled edge of the piece. Drill the blade start holes, and scrollsaw the letters.

Make the window

1 Cut a 4½×11$\frac{7}{16}$" piece of ⅛"-thick clear acrylic. Two rabbeted cleats (G) retain the window inside the mailbox. To make them safely and easily, start with a ¾×1×16" piece of stock. Plane or resaw it to ½" thick.

2 Set your tablesaw's blade to a cutting depth of ¼". Position the rip fence ⅞" from the blade to cut a ⅛"-wide rabbet on the edge of the stock. Saw a ¼×⅛" rabbet along one edge of the stock.

3 Rip a ½"-wide strip from the rabbeted stock, measuring from the rabbeted edge. Then, crosscut the two 4½"-long window cleats (G) from the rabbeted strip.

Now, assemble the mailbox

1 Drill two ¼" drainage holes in the bottom (E) where shown on the Exploded View drawing. Sand all wooden parts with progressively finer abrasive grits to 220-grit.

2 Hacksaw a 15½" length of 1½"-wide continuous (piano) hinge. (We used a brass-finished hinge.) Attach one leaf of the hinge to the unbeveled edge of the top (C), with the hinge pin adjacent to the wide face of part C. Attach the lid (B) to the other leaf.

3 Refer to the Exploded View drawing and the Side Section View, and dry-assemble parts D, E, and F between the sides (A). After checking the fit, glue the sides, back, bottom, and front together with weather-resistant glue. Clamp until the glue sets.

4 Place the assembly facedown, and glue the cleats (G) into place. The rabbets open toward the front to hold the clear acrylic against the inside of part F.

MAILBOX

5 Now, install the assembled lid and top by gluing the top (C) into place. Center it from side to side on the box assembly, and keep the back edge flush. The 20° slope makes clamping difficult, but a few wraps of masking tape around the glue-up will hold it until the glue sets.

Finish it, and hang it on your house

1 Apply a clear exterior-grade finish. Take care to cover all inside and outside surfaces.

2 After the finish dries, lay the mailbox on its back on a piece of scrapwood, and open the lid. With a portable drill and 5/32" bradpoint bit, drill mounting holes through the upper corners of the back. Drilling through from the inside after assembly places the holes where you'll be able to drive screws through them easily when you hang up the mailbox.

3 Hold the mailbox in position on the mounting surface. Level it, using a carpenter's level or by reference to a horizontal siding line, and mark the mounting-hole positions. For attachment to wood (or siding over wooden sheathing), drill 5/64" mating holes in the wall for #8 screws. Otherwise, drill holes for plastic or metal screw anchors, following the manufacturer's instructions.

4 Attach the mailbox to the house with #8 pan-head sheet metal screws of suitable length and flat washers. Use zinc-plated or stainless-steel screws and washers for rust-resistance. If you installed anchors, hang the mailbox with screws of the type and length specified for the particular anchor.

5 Remove the protective covering from the clear acrylic. Finally, slide the acrylic window into place behind the letters.

Bill of Materials

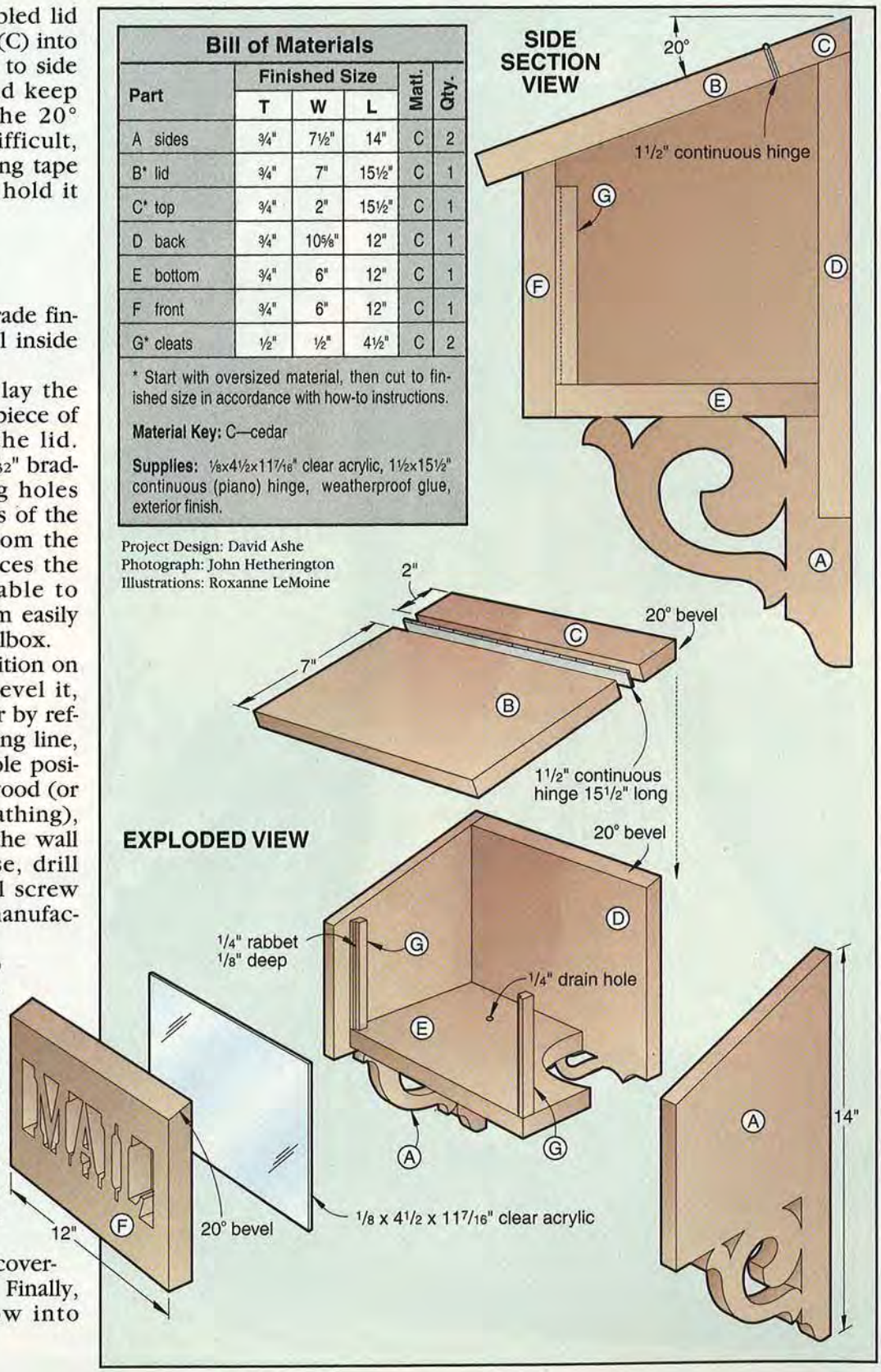
Part	Finished Size T	W	L	Matl.	Qty.
A sides	3/4"	7 1/2"	14"	C	2
B* lid	3/4"	7"	15 1/2"	C	1
C* top	3/4"	2"	15 1/2"	C	1
D back	3/4"	10 5/8"	12"	C	1
E bottom	3/4"	6"	12"	C	1
F front	3/4"	6"	12"	C	1
G* cleats	1/2"	1/2"	4 1/2"	C	2

* Start with oversized material, then cut to finished size in accordance with how-to instructions.

Material Key: C—cedar

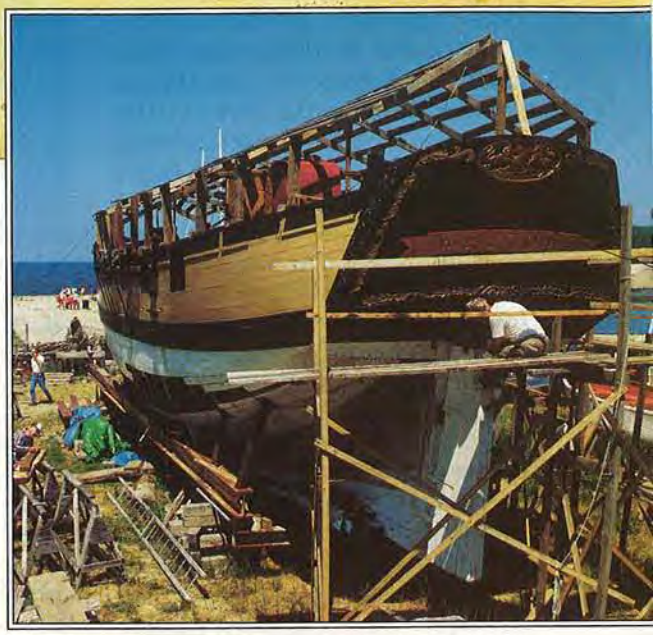
Supplies: 1/8x4 1/2x11 7/16" clear acrylic, 1 1/2x15 1/2" continuous (piano) hinge, weatherproof glue, exterior finish.

Project Design: David Ashe
Photograph: John Hetherington
Illustrations: Roxanne LeMoine



WOOD UNDER SAIL

In Traverse City, Michigan, there's a group of woodworkers quite unlike any you'll find anywhere—they help maritime history live again.



A great day at the *Welcome* restoration site: clear skies, a bay breeze, and lots of work to do.

The wooden sloop *Welcome* as she once proudly sailed Lake Michigan's Straits of Mackinac.

For hundreds of wooden ships and boats, the Great Lakes became a graveyard. But through the efforts of a group of dedicated volunteer woodworkers, some have and will escape that fate to continue sailing before the wind. The *Welcome* is one of them.

She's a sailing ship, a 1774-vintage wooden sloop that once prowled northern Lake Michigan's Mackinac Straits under the British flag. Today, however, her wooden hull acts as a beckoning beacon to men and women of diverse backgrounds who happily muster at her once, twice, and more each week to grind away at the lengthy task of restoration. The goal of Traverse City, Michigan's Maritime Heritage Alliance (MHA)—to which these volunteer workers belong—is to have the *Welcome* under sail in two years. (See box, *page 72,* for more on MHA and its many activities.)

History's helping hands

Paul Ohs, a patternmaker until his retirement a decade ago, worked on an earlier project, the 92' schooner *Madeline*, and now contributes two or three days per week to the *Welcome*. "I learned about the *Madeline* in the fall of '85 when they had just laid the keel," Paul recalls, grinning. "So I came by in the spring of '86 and worked until it was finished. Seems that I came down here for a day and stayed five years!"

What does Paul do on the *Welcome*? "Whatever the boatbuilder wants me to do," he happily replies. "Right now, this is my proj-ect, my baby." Paul points to the long, stout mast on the ground before him. "It's all Doug fir, but the part that was below deck has some dry rot, so I'm going to cut out the bad spot and make a patch using a scarf joint because it has to be tight. And a proper scarf has to be 6 to 1. That is, 6" in length for every inch of depth." Paul goes

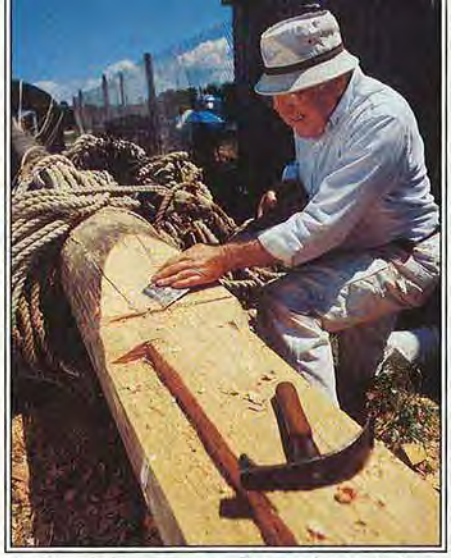
Continued

on to tell about why he likes his work on the *Welcome*: "It keeps me in touch and in tune with my past and my trade, plus all the good friends I've made. It's motivating."

Bob Core, a retired electrical engineer and one-time local boatyard owner, now directs the *Welcome*'s extensive restoration, as he did MHA's other boat-building activities. He explains the current project. "We're now—and will be for some time—replacing the old Doug fir futtocks of the frames (see the ship's frame in the photo *below*) with ones of 3"-thick, air-dried white oak that have been treated with Cupernol [a preservative produced by Sherwin-Williams]. You see, all the futtocks and frames below waterline had developed rot. We have to replace them all along the 55' length of the ship."

The boatbuilder adds how his volunteer woodworkers will also beef up the frame members in width. That will, in the end, bring the frames closer together—about 28" apart rather than the original 36". "She'll be really seaworthy, then," says Bob.

But the reconstruction is no easy task. Below the "thick-stuff," the long horizontal buffer plank that runs from bow to stern just above the waterline, lies the outboard planking. Each of the edge-joined, 2×6" white cedar planks, if still sound, must be carefully removed to reveal the rotted frames beneath. This requires drilling out the covering plugs, then unscrewing the dozens of attaching lag bolts at every frame. Tedious, but necessary work. The damaged futtock in the frame can then be replaced or repaired, a procedure that requires working from both within the hull and without, and lots of tiresome measuring, trimming, fitting, and retrimming. That's because the oak futtocks are more than just stout boards.



Cutting away to reach good wood in the mast for a scarf-jointed splice, Paul Ohs uses an adz, chisels, and other hand tools from his chest.

Inside the 55' hull of the *Welcome,* boatbuilder Bob Core directs the insertion of a new futtock to the frame by Bob Denyes, Pete DeCamp, and Ed Brown.

"To follow the curve of the ship's planking on the hull," says Bob, "each piece of oak that will become a futtock must be sawn for an exact fit. That means changing the angle of the bandsaw a few degrees for each inch along the curving length of the futtock. And in some places, depending on the curvature of the hull, the cutting angle must change in two directions. It can be frustrating!"

And MHA workers can't waste wood. The 2,000 board feet of 12/4 air-dried white oak they saw the futtocks from was a donation by a sawmill on Grand Traverse Bay's Beaver Island. It should be enough, they think, if Bob Core takes advantage of each board's potential yield.

Good fellows to fit the futtocks

Most woodworkers with no past involvement in boatbuilding would be surprised at what goes on at the *Welcome*'s restoration site. Clete Plamondon, a retired Traverse City businessman and maker of classic furniture, sure was, at first.

"We beat stuff up something fierce," laughs Bob the boat-

Clete Plamondon shapes a 3"-thick piece of white oak at the old bandsaw.

builder, referring to the framing wood that Clete is working nearby. "Clete, who is really a fine woodworker, still has a little problem with this sometimes." In fact, the heavy-duty industrial bandsaw (acquired free as a castoff from the county maintenance garage) at the site has become as familiar to Clete as the one in his own home shop, if not as accurate. At it, he deftly saws the stout oak into a rough-cut futtock without a quibble (see photo *above*). "It's because I'm doing what I can to help a worthwhile cause," Clete remarks, a smile on his face.

Hobby woodworker Paul DeCamp, a retired accountant from Ohio, makes projects of all kinds in his home shop. But he spends one day a week on the *Welcome*. "My job is to remove all the lag bolts that hold the planking on," he explains. "But that's what I come down here for, to assist the best I can, do something different, and enjoy the people."

Over at the planer, a workhorse of a machine that looked as if it had been salvaged from a scrap-iron pile, Bob Denyes guides an oak futtock through. The darkly tanned, former machinist will take an ⅛" off each side of the 12/4 rough-sawn stock.

"I moved up here in '92 from the southern part of the state," Bob says, pausing and stepping back from the planer. "My wife and I didn't know anybody. Then, one day we went aboard *Madeline* for a tour and really liked the ship and the story behind it. So we joined the Alliance [MHA]. Since then, we've met hundreds of people it seems."

Bob removes the oak from the machine's outfeed table, turns it over and carries it to the infeed. "When I come down here, usually Mondays and Tuesdays, my wife works at the MHA office. At home, I make furniture and knick-knacks for the grandkids. But here, I do whatever I can."

In the MHA workshop, a weathered building built of boards that had seen use elsewhere (see photo, *next page*), sawdust lies everywhere. So do oak futtocks, ropes, tired machinery, cans of preservative, and a contrastingly bright, varnished bowsprit off the *Welcome* against a wall.

Jim Peacock smoothes a piece of wood at the stationary sander. His carpenter's belt identifies the trade he once practiced full-time. "It's a great place to work, right here on the bay," he announces. "And there's lots to be done, not including the ship. I'm repairing a part of a shop-window frame."

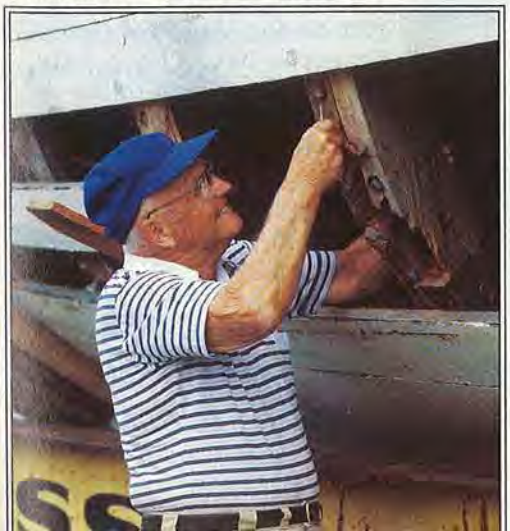
Bob Core steps into the shop, looks about, and says, "It seems that boatbuilders are always looking for some magic solution. Well, with what we're doing to the *Welcome*, 5200 and Cupernol seem to answer our needs."

He explains that 5200 is a moisture-cured polyurethane adhesive caulking compound manufactured by 3M. It's used to fill knot holes in the white oak and to caulk planking seams. Cupernol, brushed on, preserves the wood. Bob, without much thought, also describes a want list of tools and equipment to make the job easier.

"We could sure use a 20-22" bandsaw to set up inside the hull. Then, we need a big disk grinder, and an old heavy-duty jointer that can take at least an 8"-wide board." Leaning his chin in his hand, he looks about the shop. "Some air tools would be a big help, and a good compressor. Then, a big, industrial drill press that can take tapered bits, and a 12" tilt-arbor tablesaw."

Suddenly, a form fills the doorway. It's Pete DeCamp. He wipes his brow with a bandanna, then takes a sip of water from the chilled supply. He's been painting up on the scaffold that clings to the *Welcome*'s starboard side. And according to his workmates, doing one heck of a job refreshing the ship's bold yellow and black colors. "You know," Pete says softly, "for forty years I was a civil engineer and dreamed of working with my hands.

Ed Brown, a Maritime Heritage Alliance co-founder, digs away at one of the *Welcome*'s many rotted futtocks.



Continued

Recapturing the days of sail

Lovingly restored by volunteer craftsmen, the 33'-long, low-sihouette, wooden sloop *Witchcraft* is once again a race horse on Grand Traverse Bay.

The Maritime Heritage Alliance was founded as a nonprofit organization dedicated to preserving the maritime history of the upper Great Lakes region. Edwin Brown, a retired city planner, was a founding member and former MHA president. He recalls the group's beginnings:

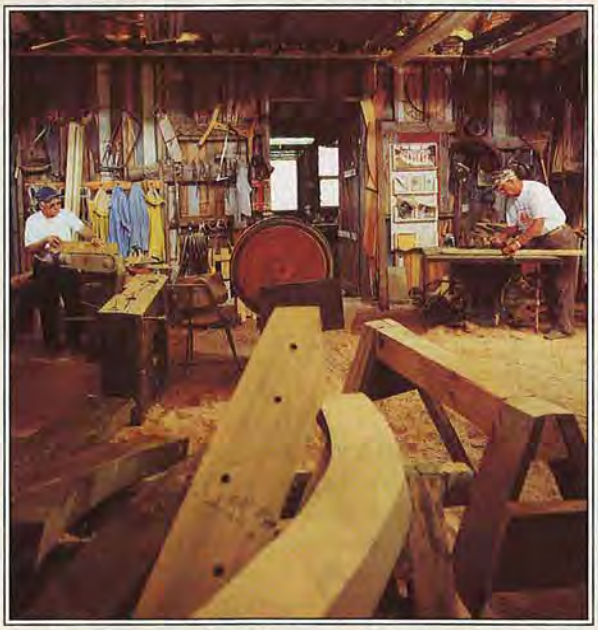
"I grew up in Michigan's Upper Peninsula always wanting to sail," Ed says. "Sometime after I had retired and moved to Traverse City, I was reading about a group in another part of the state that wanted to build a replica of a historic Great Lakes' sailing schooner. They were dickering with a Traverse City boatbuilder by the name of Bob Core to draw the plans. Because I was a maritime history buff, I thought I should meet this man."

He did. And according to Ed, the two talked for hours about wooden boats, lake history, and boatbuilding. "Bob finally said 'What this town needs is a wooden boat show!'" That October they had one. That was in 1980, and it became an annual event.

By 1982, Ed and Bob had been joined by several others who were interested in old wooden boats, too. So they decided to build one—a replica of a Mackinaw boat, a type of small 1800s' sailing vessel popular around the Straits of Mackinac for fishing and transportation. "To build the 20' *Gracie L.* [as they named the Mackinaw boat], we needed a formal organization to raise funds," Ed explains. And the Maritime Heritage Alliance was born. The *Gracie L.* was launched two years later.

In 1985, MHA tackled a more ambitious project in the *Madeline*, a replica of a 92', twin-masted schooner that plied the lakes as a commercial vessel during the mid-1800s. By the time the *Madeline* was launched in 1990, 165 volunteers had donated 40,000 hours to her creation and spent $500,000 in construction. Now the *Madeline,* with a volunteer crew of MHA members, sails the Great Lakes as the official goodwill ambassador of her port city.

By comparison to the *Madeline* a much smaller project, the 33' sloop *Witchcraft* was carefully restored by MHA in 1992. Although lacking the historic depth of the first two boats, the sleek *Witchcraft* (shown under sail *above*) represents the design inspiration of a local boatbuilder, William A. Livingston, whose widow donated the craft. MHA craftsmen reworked the teak decks and white-cedar planking.



Built from used clapboards and other donated lumber, the dirt-floored Maritime Heritage Alliance shop sees lots of woodworking action practically year-round.

MHA's current project, the armed sloop *Welcome*, marks the first large-scale restoration of a truly historic Great Lakes craft. The present *Welcome*, a replica of the original, was commissioned by the state of Michigan for the nation's 1976 Bi-Centennial. The original ship was built by fur trader John Askin in 1774 to haul cargo. It was then purchased by the British in 1779 and sailed as a fighting vessel until it sank in a 1781 storm.

Prior to the replica ship's problem with below-waterline decay, the *Welcome* was docked in Mackinaw City, Michigan, and drew over a million visitors. But unseaworthy, the sloop could only be sunk as an attraction for scuba divers or given away. That's when MHA stepped in.

After negotiation with the state, MHA bought the damaged sloop for $1 and moved her to the present construction site at the Michigan Maritime Academy pier on the shores of Grand Traverse Bay. The scenic lakeside work area (open to the public) is kindly provided by Northwestern Michigan College's Board of Directors.

For more information on MHA, write:
Maritime Heritage Alliance
P.O. Box 1108
Traverse City, MI
49685-1108.

Written by Peter J. Stephano Photographs: John Williams/Commercial Photography, Inc.; Mackinac State Historic Parks

THE *WOOD*® GANG BUILDS KIT FURNITURE

The kits arrive! Larry Johnston, Cheryl Cibula, Bob Settich, and Jim Harrold share the glee that goes with no broken parts.

Do woodworkers buy kits? We can't speak for all of them, but when the opportunity came up for four members of the *WOOD* magazine staff to order some kits, then build the items, nearly everyone wanted in. Here are the experiences of those who took part.

Lottery-fashion, the names of the kit builders for this article where drawn from a hat. The agreement: Those selected would pick one kit priced around $150 from a catalog (also drawn from a hat, each supplier realizing that the kit would be for used as the basis for an article). Each participant would build that item, report what it was like, and have their photo taken somewhere during assembly, then with their finished kit. For their time and trouble, they got to keep what they made.

About our kit builders

Just so you'll better understand the comments of our kit builders (shown *above*), here's a little background on each of them:

• *Cheryl Cibula, graphic designer.* Cheryl designs *WOOD* magazine's Shop Tips, Products that Perform, Finishing Touches, Ask WOOD, and other pages. Admittedly a novice-level woodworker, Cheryl had made a few things in the *WOOD* magazine shop prior to attempting the kit—bandsawn boxes and a few small turnings.

• *Jim Harrold, managing editor.* Jim's woodworking skills exceed the intermediate. When he's not editing copy and checking project drawings, Jim works in his shop building niceties for his home.

• *Larry Johnston, special-interest editor.* Charged with presenting woodturning, carving, scrollsawing, and small projects to our readers, Larry does a variety of woodworking. But he never gets to build anything as large as the kit he ordered.

• *Bob Settich, senior writer, Weekend Woodworking™.* Bob creates the articles that appear in our bimonthly sister publication. He's quite a woodworker, too, and once owned a mail-order company that specialized in woodworking supplies.

Now that you have met the participants, read on for their kit encounters. Who knows? You might want to try one, too.

Continued

Print this article

The 20-minute table

Given his considerable woodworking credentials, Larry was a bit of a ringer for a kit builder. Yet, his chosen project was the simplest to tackle of all the kits that were ordered. Here's what he had to say about it:

"The table kit came in a substantial-looking box, with the legs and pedestal packed with bubblewrap and corrugated cardboard. Thin plywood protected the tabletop." With protection like that, the kit parts arrived unscathed. And as Larry reported, unpacking them was equally impressive.

"The pedestal, the first piece I unpacked, was great to behold. Its staved cylinder showed good grain and color matching, and first-class turning with sharp details. There was no chipping or end-grain tearout, and the surface felt as if it could be finished with practically no sanding. And that was the same for the top, with its edge profile already cut."

Larry noted the manufacturer's care in dealing with the possible effects of humidity in various areas of the country. "According to the information sheet, the top's edge had been coated with Nelsonite, a surface sealer used to negate any changes in the relative humidity no matter where it was sent. I had to sand it off the top before finishing."

Assembly, Larry claims, was a snap. "Pretty much a matter of removing and reinstalling four bolts and tightening six nuts onto studs. The whole job took about 20 minutes, using just a ½" open-end wrench and a rachet with a ½" socket," Larry said.

So what is his appraisal of the kit? "The assembled table is solid

The clock of confusion

The photograph in the Klockit catalog didn't lie. Jim's 400-Day Crystal Anniversary Clock is a beaut! But getting there wasn't as easy as expected.

"I've always had the idea that building something from a kit was a great way for a novice to ease into more challenging woodworking projects," Jim commented. "But working through this kit, I realized that you needed a bag of woodworking tricks to make everything come out just right."

Jim's assignment started off well enough. First, delivery was prompt: It came the same week it was ordered. Second, nothing was

Jim had to reach into his bag of woodworking tricks before he got his clock together.

A woodworking mission

In addition to the number of available kits that appealed to her, Cheryl was impressed by the skill-level rating that Grand River Workshop gives each of them. And she readily admitted that the kit she chose was above her woodworking level. "But with the occasional help of my coworkers, my phone stand became a great learning experience," she said.

Protective packaging is all-important in the mail-order business, and Grand River Workshop doesn't take exception. Everything arrived in perfect shape. Cheryl liked that the parts were numbered, the kit was guaranteed, and there was a phone number to call for help. It turned out she needed the number. "A drawer knob was missing. They quickly sent me one."

Perhaps because she's a graphic designer, Cheryl thinks the directions could be helped a lot with a few more illustrations and reference points. "The directions explained how to install the drawer slides and guides, but it was confusing without an illustration," she emphasized.

After spending about three hours sanding the parts, then dry-fitting them, she was ready to glue. "I was warned that my kit required a fair amount of clamping experience, which I found to be true," Cheryl commented. "I had a hard time getting one of the sides to square up and got help."

To that lesson, Cheryl added another: How to deal with warped wood. "The bottom shelf was ever so slightly warped—enough not to fit in the side dadoes. I ended up taking off a tiny bit on the tablesaw." She also

Two tools, a few minutes, and just a tad of sanding, and Larry's table was ready to finish.

and substantial, a professional-looking job. I'd feel guilty telling anyone that I built it myself, though. It didn't call for much woodworking skill—the parts fit together flawlessly. And the Adams folks have even taken care of most of the grunt work—the finish sanding."

Larry's kit: Oak, tilt-top Duncan Phyfe table, No. A1639, $169 (plus shipping charge). From Adams Wood Products L.T.D.,L.P., 974 Forest Dr., Morristown, TN 37814, 615/587-2942, FAX 615/586-2188. Free catalog.

broken, even though the package contained glass and a mirror.

Confusion began with a parts' inventory. "There were washers missing, and dowels included that weren't on the bill of materials—the dowels ended up being too short, anyway," he reported. There was a pleasant surprise, though. Glue came with the kit. Then there was a bit of disappointment. A walnut piece destined for a clock foot didn't match the others in color.

When Jim got to the instructions, confusion reared its head again. There were two sets—on the same sheet of paper! It seems that a revised set of instructions, as well as a new exploded-view drawing, were printed on the back of the old version. On top of that, important gluing and clamping instructions were omitted, he noted with some disappointment.

The instructions did suggest dry-fitting the parts before gluing. "This turned out to be good advice because the machined grooves in the posts for the glass and mirror didn't line up perfectly with the base and top," Jim recalled. Considerable sanding was required to remedy the situation. He also had to widen the pre-drilled pilot holes to avoid splitting the walnut, but that was an easy enough task.

What about Jim's satisfaction level? "The end result is as beautiful as the photograph in the Klockit catalog, but achieving it took considerable tinkering and problem solving," he said. "More precise machining of parts and *one* set of updated instructions would do wonders to make this a frustration-free kit."

Jim's kit: 400-day crystal anniversary clock, No. 34318, $189.95 ($8.95 shipping). From Klockit, P.O. Box 636, Lake Geneva, WI 53147. 800/556-2548. Free catalog.

Cheryl learned much about clamping and squaring with her telephone-stand kit.

had a problem with the drawer fitting too tightly. A little sanding took care of that.

So how did it go overall? Cheryl's tickled. "After building this, I think that it's a great way for someone to gain woodworking knowledge and have a nice project to show for it. In fact, I'll probably need another piece."

Cheryl's kit: Mission-style telephone stand, No. 201A, $159.95 ($14 shipping). Grand River Workshop, 1955 NW 92nd Court, Clive, IA 50325. 800/373-1101. Catalog, $2.

Continued

Shaping up Shaker

Like the other kits we received, Bob's clock from Shaker Workshops arrived in great condition, carefully cushioned in a sturdy box. Bob's initial inspection of the parts showed that the solid cherry parts had been carefully selected, with consistent color and figure. In particular, the cherry plywood back panel had book-matched veneers—a quality touch. The four pages of directions contained one photo and two drawings.

Despite the completeness of the instructions, Bob encountered difficulty in assembly, particularly the trim pieces of the door. Here's how Bob described it:

"The directions warned that 'Patience and precision are required for a successful result.' I did a quick dry-assembly of the mitered door-trim pieces and found that the miters didn't fit. After a session of attempted clamping, I finally decided that it was futile because of inaccuracies in the miters. The joints simply would not close tightly."

Bob could have filled the gaps with wood putty, but that would have been unsightly. Instead, he called Shaker Workshops to check their customer service. "The people I spoke with on the telephone were very polite, and they agreed to send a new door panel and mitered trim pieces at no charge. The parts arrived by UPS second day air delivery."

The new trim pieces fit better, but were a bit too long. So, Bob clamped the assembly to a plywood backing board and carefully hand-cut through each joint with a fine-toothed backsaw, then glued-up the assembly. At this point a new problem arose. "The vertical door-trim pieces were now slightly too short," he explained. "I got a piece of cherry, resawed and planed it to make all-new door-trim pieces." The balance of the assembly was less harrowing. His conclusions:

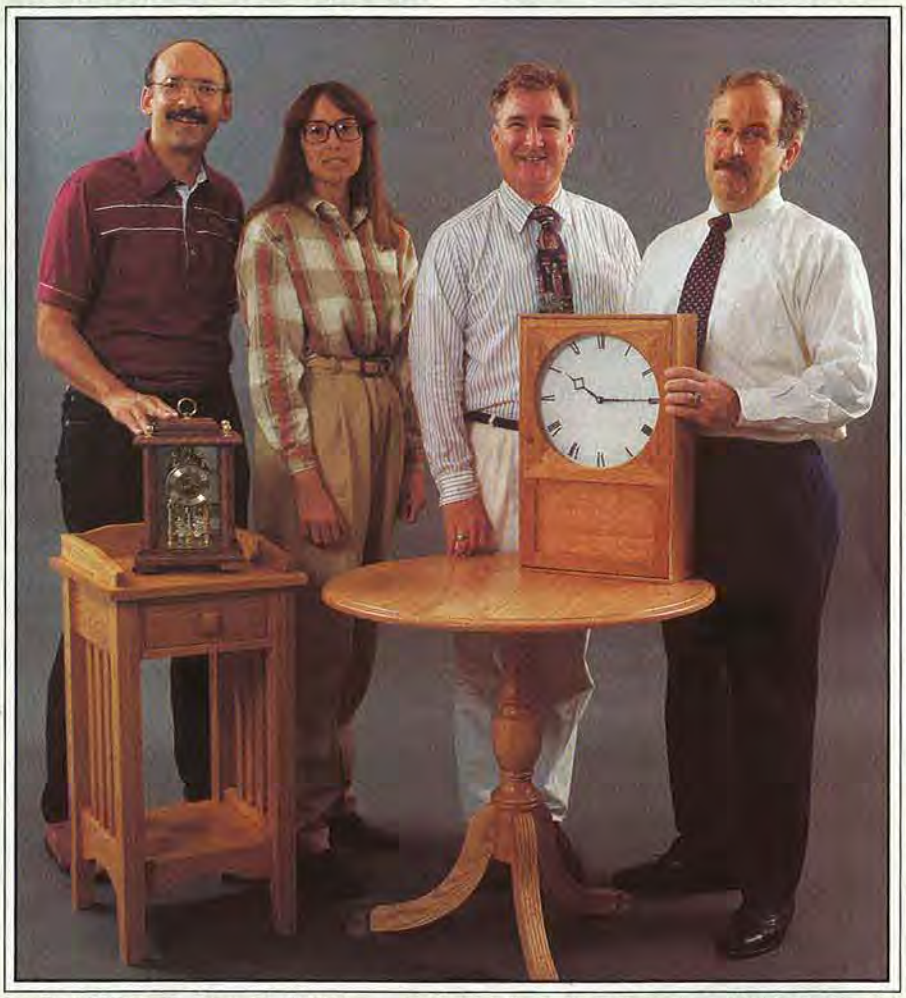
"I frankly did not expect that a kit-furniture project would be so challenging or require me to do so much woodworking. Builders without access to a well-equipped shop would have had to settle for some poorly fitting joints.

"Advice? Check the kit supplier's refund and parts-replacement policies before you order, because they may all differ. Test-fit the parts before assembly. If they don't fit, call for new ones. If those don't fit, consider returning the entire kit."

Bob's kit: Wall clock, No. F322, $125 ($6.65 shipping).Shaker Workshops, P.O. Box 1028, Concord, MA 01742. 800/840-9121. Free catalog.

So that's how it went with the *WOOD*® gang and kit furniture. Despite some gripes, you can bet each of them would accept another kit-building challenge.

The wonderful selection of cherry in Bob's Shaker wall-clock kit didn't help it go together any easier.



Jobs well done. The kit builders stand by their handiwork: a 400-day crystal anniversary clock, a mission-style telephone stand, a tilting pedestal table, and a Shaker wall clock.

Written by Peter J. Stephano Photographs: John Hetherington

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3300-1	Rt Angle Drill	193
3107-1	VS Rt Angle Drill	218
5192	Die Grinder	174

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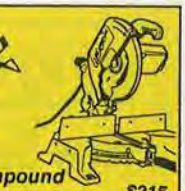

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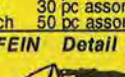

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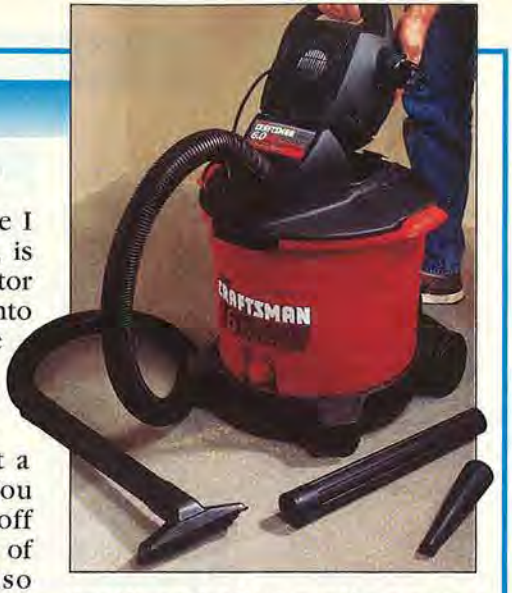
Circle No. 2

TOOL BUYER'S UPDATE

New Sears vacuum features detachable blower



In our last test of shop vacuums (see the April 1995 issue) the Sears 16-gallon model 17700 scored a healthy 9 out of a possible 10 points for overall value. But the new top-of-the-line model, Sears 16-Gallon Wet/Dry Vac with Detachable Blower, tops the old model in performance, versatility, and ease of use.

The rolling cart comes with two large fixed wheels in the rear and swivel casters in front that make it practically tip-proof. The back of the cart contains a molded tool caddy that holds up to five accessories. And for easy dumping, you can quickly remove the 16-gallon canister from the cart.

On the old Sears shop vacuum, the lid locks were placed under the handles. This occasionally caused the lid and motor to fall off when you picked the vacuum up by the handles. On the new machine, separate handles and locks eliminate the problem.

The part of this new machine I found most valuable, however, is the detachable blower. The motor and exhaust port are molded into a single piece that locks on the top of the vacuum. Flip one latch and you can take the unit off. Attach the cone-shaped nozzle and you've got a powerful, portable blower. You can use this device to clean off projects and blow sawdust out of power tools. The blower also comes in handy for clearing away leaves and grass clippings.

By beefing up the new motor to 12 amps, and by improving the fit and airtightness of the lid and the seals, Sears made the company's most powerful shop vacuum yet. The only thing I don't like is that the motor creates the same loud, shrill whine as the older models.

The new Sears vacuum costs $40 more than the previous top-of-the-line machine. But given the detachable blower (a $60 value by itself) and all the other smart design features, I consider it the best value of all the shop vacuums I've seen for under $150.

—Tested by Bob McFarlin

PRODUCT SCORECARD

Sears 16-gallon Wet/Dry Vac with Detachable Blower, model 17706

Performance	★ ★ ★ ★ ★
Price	About $140
Value	★ ★ ★ ★ ★

At Sears stores nationwide. To order or for information, call 800/377-7414.

Pneumatic detail sander removes material fast

Like the electric-powered detail sanders that I reported on in the November 1994 issue of *WOOD®* magazine, the Fein Air Triangle Sander has a small pad for sanding into tight spots. But the use of a pneumatic motor, rather than electric, makes a big difference.

The pneumatic Fein sander quickly impressed me with its aggressiveness. For a comparison, it took me 15 minutes to sand the nooks and crannies on one side of a dresser with an electric detail sander. The Fein blazed through the other side in just 5 minutes.

Had my compressor been able to satisfy the Fein's appetite for air, I might have accomplished this work even faster. My 6.4 cfm at 90 psi compressor had a hard time keeping up. The manual recommends a minimum of 7.6 cfm at 86 psi. You also might want to use an air compressor with a combination regulator/lubricator air-supply line. Otherwise, according to the manual, you have to stop and add a drop of oil to the machine every two minutes.

As for vibration, the Fein Air Triangle Sander felt about the same as the Bosch B7000 and the Ryobi DS2000, but less severe than the Ryobi DS1000. Like most pneumatic tools, the Fein makes a lot of noise, but this isn't too objectionable since the sander works so fast that it's never in your hands for long.

You can order this machine with either hook-and-loop or adhesive-backed sanding sheets. The manufacturer also sells a dust-collection kit for about $50, but this was not available at the time I conducted these tests.

Given the price, this tool may not be appropriate for every woodworker. And, bear in mind that a properly sized compressor will cost at least $500. But if you intend to refinish a houseful of ornate woodwork or a lot of large antiques, this machine's fast and aggressive sanding would save you enough time and effort to more than pay for itself.

—Tested by Bill Krier

PRODUCT SCORECARD

Fein Air Triangle Sander

Performance	★ ★ ★ ★ ★
Price	About $200
Value	★ ★ ★ ★ ☆

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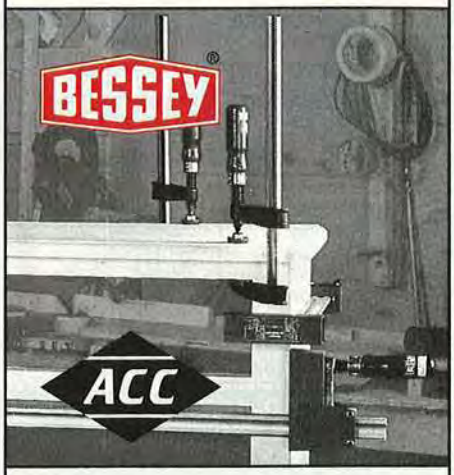

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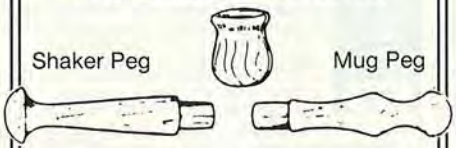

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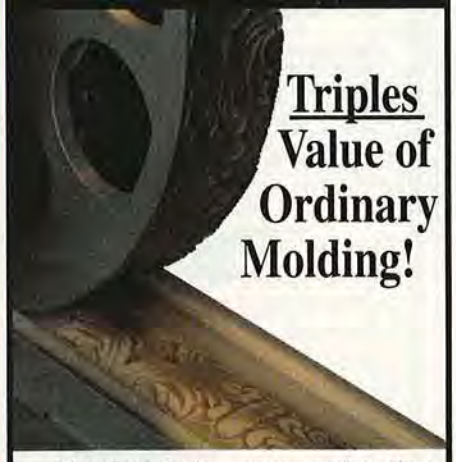

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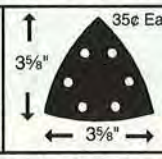

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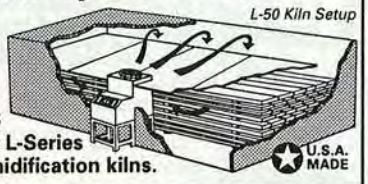

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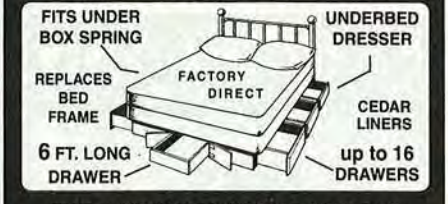

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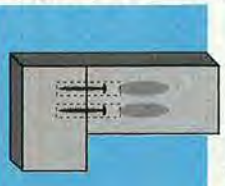

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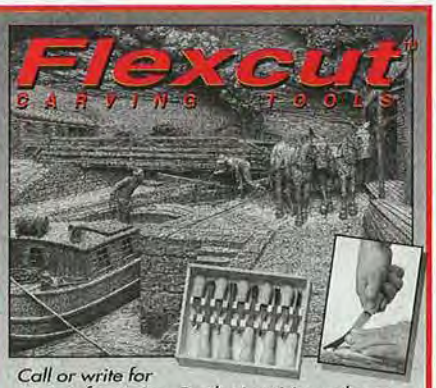

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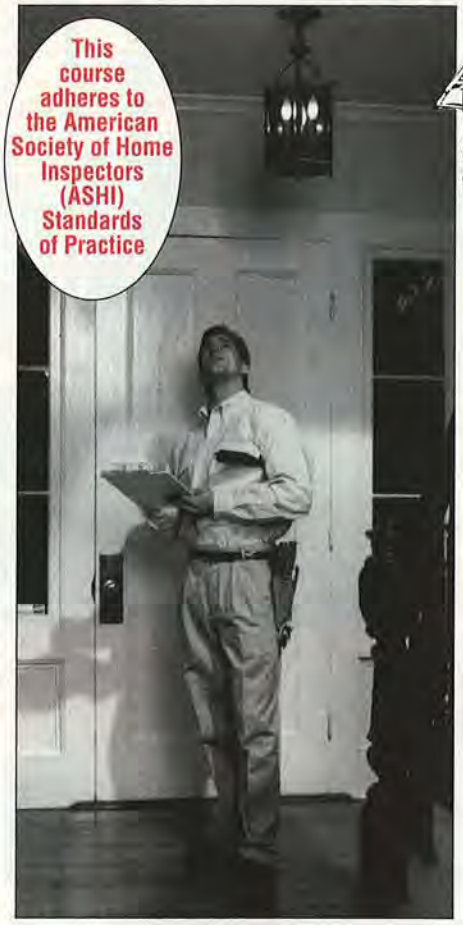

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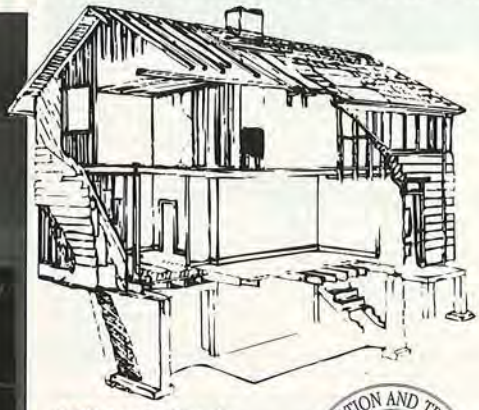

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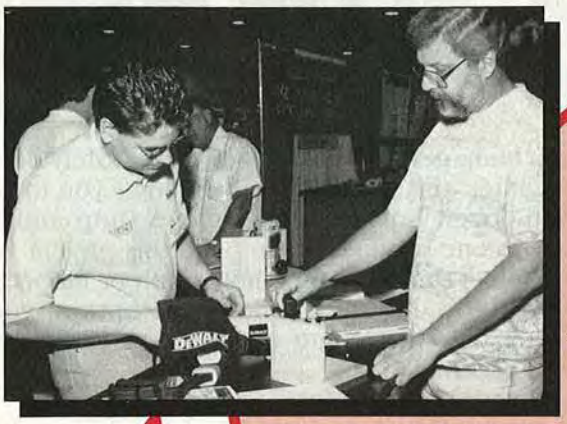

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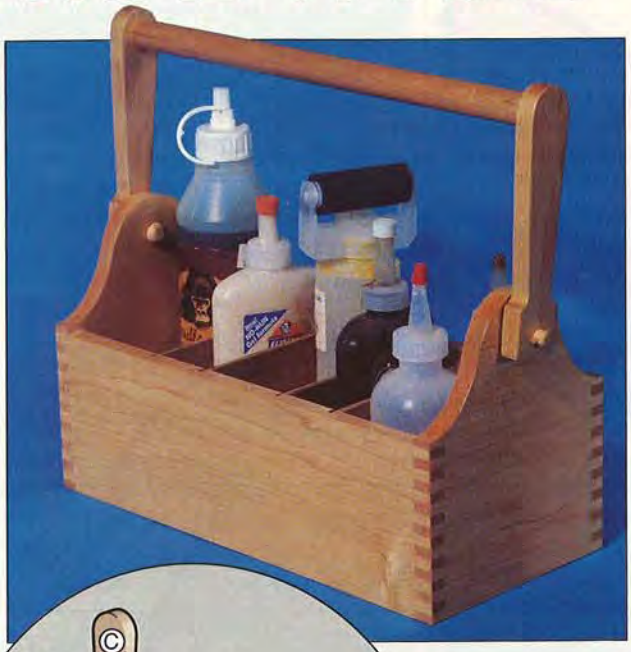


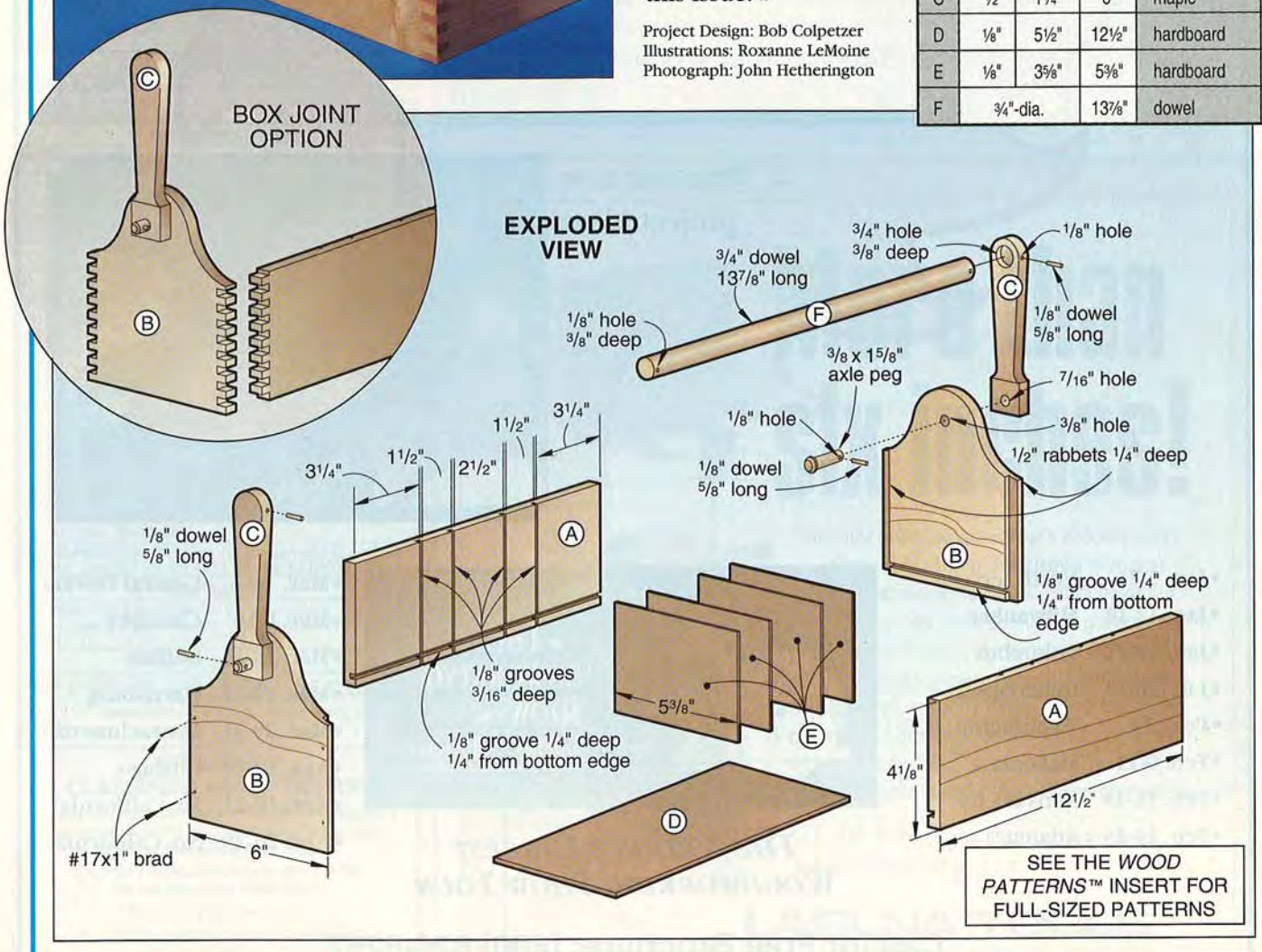
If your shop gets too cold to store glue safely during the winter, this handy glue tote allows you to haul a half-dozen bottles between the shop and the house with one hand. You can build this project with the box joints shown in the photograph or rabbet the corners. If you choose the box-joint option, you'll need to change the length of part D to 12" and the length of part F to 13⅜".

If you need directions for cutting box joints, see the article we published on *page* 77 of the August 1992 issue of *WOOD*® magazine for some tips. And for full-sized patterns of the box ends and handles, turn to the *WOOD PATTERNS™* insert in the center of this issue.

Project Design: Bob Colpetzer
Illustrations: Roxanne LeMoine
Photograph: John Hetherington

Bill of Materials

Part	Finished Size T	W	L	Material	Qty.
A	½"	4⅛"	12½"	maple	2
B	½"	7"	6"	maple	2
C	½"	1¼"	6"	maple	2
D	⅛"	5½"	12½"	hardboard	1
E	⅛"	3⅝"	5⅜"	hardboard	4
F	¾"-dia.		13⅞"	dowel	1



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Model	Description	List	Sale
23-700	Wet/Dry Grinder	234	155
23-710	New Sharpening Center	210	165
23-680	6" Bench Grinder 1/4 HP	86	69
11-950	8" Drill Press	199	128
31-050	1" Belt sander 2.0 amp	104	75
31-460	4" Belt/Disc Sander	198	129
40-560	16" 2 speed Scroll Saw	266	169
40-530	NEW 16" Scroll Saw	153	115
11-990	12" Bench Drill Press	276	184
11-090	32" Radial Bench Drill Press	399	305
43-505	1/2" Bench Router/Shaper	399	295
22-540	12" Bench Top Planer	Sale	385
	FREE Set of extra knives included !		
36-220	10" Compound Mitre Saw	350	215
28-180	Bench Band Saw	232	158
28-190	NEW 12" Band Saw	465	395
40-640	20" Bench Scroll Saw	466	295
37-070	NEW 6" v/spd Bench Jointer	337	258
14-650	Hollow Chisel Mortiser	666	285
46-700	12" Wood Lathe	548	449
33-990	10" Radial Arm Saw	818	695
37-280	6" Motorized Jointer	488	389
33-055	8-1/4" Sawbuck comp w/legs	865	629
36-040	8-1/4" Compound Mitre Saw	224	149
36-905	30" Unifence	385	249
36-906	50" Delta Unifence	525	305
36-755	10" Tilting Arbor Saw	1264	1039
17-900	16-1/2" Floor Drill Press	462	415
33-060	"Sidekick" Miter Saw	510	389
37-190	6" Deluxe Jointer	554	479
36-275	8-1/4" Builders Saw	444	265
36-210	10" Compound Mitre Saw	438	255
36-070	10" Mitre Saw	284	165
34-555	Sliding Table	459	289
22-661	13" Planer w/ stand 2 HP	1513	1239
22-675	NEW DC380 15" Planer	1439	1275
37-154	6" Jointer w/ mobile base	1451	1239
34-444	Contractors Table Saw	812	659
34-445	34-444 Saw w/30" Unifence	1200	829
	above saw comes w/ mobile base		
28-283	14" Band Saw w/enc. stand	910	779
	above saw comes w/ mobile base & fence		
36-250	NEW 10" Slide Compound Saw	825	489
36-230	NEW 12" Compound Mitre Saw	480	359

MILWAUKEE TOOLS

6527	NEW Sawzall with case	320	178
6528	above Sawzall w/wired cord	316	178
0408-6	12V Drill w/kyls chuck & 2 batt	172	
0406-1	9.6V Drill Kit with 2 batteries	332	159
0224-1	3/8" Drill 4.5 amp magnum	227	128
0234-1	1/2" Drill 4.5A mag 0-850 rpm	237	139
0235-1	1/2" Drill w/keyless chuck	237	139
0244-1	1/2" Drill 4.5A mag 0-600 rpm	237	139
0222-1	3/8" Drill 3.5 amp 0-1000 rpm	198	119
0228-1	3/8" Drill 3.5 amp 0-1000 rpm	195	115
0375-1	3/8" close quarter Drill	237	139
0379-1	1/2" close quarter Drill	268	158
6546-1	cdls Scrwdvr 200 & 400 rpm	141	84
6547-1	6546-1 w/bits, 1/4" chuck, & cse	176	105
5399	1/2" D-hdle Hammer Drill Kit	332	194
6507	Original SawZall with case	264	152
5397-1	3.8" var. spd Hammer Drill Kit	255	145
5371-1	1/2" var. spd Hammer Drill Kit	340	188
3107-1	1/2" v/spd right angle Drill Kit	399	228
6754-1	Drywall Gun 0-4000 5.4 amp	196	114
3300-1	1/2" var. spd right angle Drill	356	214
5680	Router 2 HP w/ 1/4" & 1/2" collets	362	165
6142	4-1/2" Grinder w/cse & access.	208	125
6749-1	Drywall Gun 0-2500 5.4 amp	218	132
6365	7-1/4" Circular Saw 13 amp	218	125
6366	6365 w/fence & carbide blade	228	129
6368	6365 w/fence,carb. blde,& cse	249	142
6377	7-1/4" Worm Drive Saw	330	189
6256	Top Handle Jig Saw	264	158
6490	10" Mitre Saw	444	259
6491	6490 w/ carbide blade & bag	532	325
6494	10" Compound Mitre Saw	444	319
0422-1	NEW 12V Hammer Drill w/2 batt	430	249
0431-1	NEW 12V Drill w/ 2 batteries	385	229

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LU72M010	Gen Pur. A.T.B.	10"-40	69	42
LU82M010	Cut-off 10"	60	93	45
LU84M011	Comb 10"	50	78	42
LU85M010	Super Cut-off	10" 80	115	59
LM72M010	Ripping 10"	24	69	38
LU73M010	Cut off 10"	60	84	45
LU87M010	Thin Kerf 10"	24	72	42
LU88M010	Thin Kerf 10"	60	88	45
LU98M010	Ultimate 10"	80	128	68
LU91M010	Compnd Mitre 10"	60	88	54
F410	NEW Quiet Blade 10"	40	95	49
F810	NEW Quiet Blade 10"	80	135	74
TK303	7-1/4" Finishing	40	38	25
TK906	10" Combo	50	53	32
SD308	8" Dado - Carbide		230	119
SD506	6" carbide w/case & shims		292	155
SD508	8" carbide w/case & shims		344	168
F10	2-1/8" x 3/4" Biscuit 1000 Qty		43	29
F20	2-3/4" x 1" Biscuit 1000 Qty		45	29
FA	Assorted Biscuits 1000 Qty		45	29
FB100	16 piece Forstner Bit Set		338	189
94-100	5 pc. Router Bit Door System		320	159
TR215	10" Slide Cmpd Mitre Saw		688	369

The following tool has a $20.00 rebate thru 3/31/96

FT2000E	3-1/4 HP v/sp Plunge Router	410	209

The following tools have a $30.00 rebate thru 3/31/96

JS100	Biscuit Jointer w/ case	334	168
JS102	Biscuit Jointer w/fence & case	355	179

MAKITA TOOLS

Model	Description	List	Sale
6172DWE	3/8" v/spd Drill Kit w/ 2 batt	220	109
5090DW	3-3/8" Saw Kit 9.6 volt	270	148
ML900	Incandescent Flashlight 9.6V	Sale	37
DA391DW	3/8" angle Drill Kit 9.6 volt	312	179
6012HDWE	2 speed Drill Kit w/2 batt.	243	135
6095DWE	6095DW Drill Kit w/2 batteries	270	139
6095D	6095DW Drill only & case	Special	79
632007-4	9.6 volt Battery	47	30
632002-4	7.2 volt Battery	39	28

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6212DWG	12V 3/8" Drill Kit w/ LED batt	412	228
6312DWG	12V 1/2" Drill Kit w/ LED batt	432	239
6201DWHE	9.6V 3/8" Drill Kit w/ 2 batt	351	175
6211DWHE	12V 3/8" Drill Kit w/ 2 batt	368	185
6311DWHE	12V 1/2" Drill Kit w/ 2 batt	399	205
5007NBA	7-1/4" Saw w/electric brake	263	138
9900B	3" x 21" Belt Sander w/bag	344	179
9924DB	3" x 24" Belt Sander w/bag	329	189
4301BV	Orb. var. spd Jig Saw 3.5A	292	155
JR3000V	var. speed Recip Saw w/case	252	139
9820-2	Blade Sharpener	394	215
N1900B	3-1/4" Planer with case	244	134
N9514B	4" Disc Grinder 4.6 amp	111	65
B04552	1/4 sheet Pad Sander w/bag	98	55
DA3000R	3/8" Angle Drill	314	185
2708W	8-1/4" Table Saw	585	309
2711	10" Table Saw with brake	1067	599
6405	3/8" Drill Rev. 0-2100 rpm	112	68
6510LVR	3/8" Drill Rev. 0-1050 rpm	168	98
6013BR	1/2" Drill Rev. 6 amp	280	149
9401	4" x 24" Belt Sander w/bag	378	239
4303C	var. speed Orbital Jig Saw	351	205
5077B	7-1/4" Hypoid Saw	281	155
5007NB	7-1/4" Circular Saw 13 amp	232	124
5007NBK	5007NB Saw w/ plastic case	Sale	129
LS1011	10" Slide Compound Saw	946	525
LS1211	New 12" Slide Cmpd Saw	1550	795
3901	New Plate Joiner Kit	372	209

SENCO AIR NAILERS

SFN1+	Finishing Nailer 1" - 2" w/ case	448	335
SN325	Nailer 1-7/8" - 3-1/4"	665	419
SLP20	New Pinner w/cse 5/8 -1-5/8"	399	278
SKS	Stapler 5/8" - 1-1/2"	390	275
SN70	Fram. Nailer Clip Hd 2"-3-1/2"	690	479
SN60	Fram. Nailer-Full Hd 2"-3-1/2"	638	449
SN65	15% more power than SN60	709	479
SFN40	NEW Finish Nailer 1-1/4 - 2-1/2	571	389

BOSTITCH AIR NAILERS

N80S-1	Stick Nailer	Super Sale	355
RN45	Coil Roof Nailer 3/4 - 1-3/4	845	395
N60FN-2	Finishing Nailer	650	335
BT35-2	Brad Tacker 5/8" - 1-3/8"	275	159
BT35-2K	BT35-2 w/ case, oil, & brads	299	169
CWC100	1 HP Pancake Compressor	463	289
MIIIFS	Flooring Stapler 15 gauge	931	529
S32SX-1	Finish Stapler - 1/2" - 1-3/8"	275	159
S32SX-1K	S32SX-2 with case & oil	269	169

SKIL SIZZLERS

2735-04	12 volt cordless Drill Kit	249	144
2736-04	2735-04 with keyless chuck	269	148
1605-02	Biscuit Joiner w/case	221	135
3400	10" Table Saw - Bench Top	270	189
77	Famous 7-1/4" Worm Drive Saw	Sale	144
77M	NEW 77 Mag Worm Saw - 2 lbs lighter than Model 77	Sale	159

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EY6205EQK	12V Drill, w/ 15 minute charger, Ironman battery, & case	368	195

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EY6181CRKW	9.6V Drill Kit w/ 2 batteries, 1 hour charger, & case	305	165
EY6181EQK	9.6 volt Drill with 15 min. charger, case & Ironman battery	315	169
EY6100CRKW	12 volt Drill Kit with 2 batteries, 1 hour charger, & case	358	188
EY6100CQKW	Same as EY6100CRKW but has 15 minute charger	420	198
EY6100EQKW	12 volt Drill kit with 2 Ironman batteries, 15 min. charger, & case	375	199
EY6101SQK	12 volt 1/2" Drill w/ 15 min. charger, diagnostic battery, & case	420	249

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IM325	Impulse Framing Nailer Kit	849	548

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505	High performance Airless Painter	440	369
HVLP	Fine coat finishing HVLP System	195	159
CS2000	Pro fine finish HVLP System	339	278

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Airy Air Nailers

0241SK
Brad Nailer 3/8"-1 9/16"
Same as Senco SLP-20
List 180 Sale 98

0250SK
Brad Nailer 3/4"-2"
List 296 Sale 164

0626SK
1/4" Crown Stapler 3/8"-1"
List 194 Sale 104

0635SK
1/4" Crown Stapler 1/2"-1-3/8"
Same as Senco SKS
List 310 Sale 175

EZ-1
New Multi-purpose nailer & stapler
List 180 Sale 98

Above Nailers come w/case, fasteners, oil & wrenches

0565T
Angle Finish Nailer 1"-2-1/2"
List 386 Sale 205

DELTA #34-080 10" MITRE BOX XTRA SPECIAL 194.00

DEWALT TOOLS

Model	Description	List	Sale
DW364	7-1/4" Circ. Saw w/brake	285	158
DW945K-2	12V cdls Drill Kit w/2 batt	309	185
DW610	1-1/2 HP 2 handle Router	274	149
DW411	1/4 sheet Palm Sander	97	58
DW100	3/8" Drill, 4 amp,0-2500 rpm	118	68
DW682K	Biscuit Joiner with case	429	219
DW705	12" Compound Mitre Saw	706	359
DW625	3 HP var. spd PlungeRouter	Sale	275
	DW625 Router comes with FREE DW6966 Fine Depth Adjuster!		
DW675K	3-1/8" Planer with case	289	164
DW431	3 x 21 v/spd Belt Sander	331	184
DW421	5" Palm Random Orbit Sander	125	74
DW444	6" Ran Orb Sander-PSA pad	266	139
DW443	DW444 w/hook & loop pad	266	139
DW673K	NEW Laminate Trimmer Kit	364	215
DW930K	NEW 12V 5-3/8" Trim Saw Kit	370	199
DW935K	NEW 14.4V 5-3/8" Trim Saw Kit	444	237
	DW935K comes with two batteries!		

DEWALT CORDLESS DRILLS

DW952K	3/8" v/spd w/two 9.6V batt	280	145
DW962K-2	3/8"v/sp w/two 9.6V XR batt	324	179
DW972K-2	3/8"v/sp w/two 12V XR batt	352	189
DW904	12 volt flashlight	29.95	
DW972K-2	drill & DW904 flashlight	Sale	205
DW991K	3/8"v/sp w/one 14.4V XR batt	370	199
DW991K-2	above drill w/ 2 batteries	Sale	225
DW944KQ	1/2" v/spd w/1 14.4V XR batt	450	235
	Above drill kits come w/ charger & steel case!		
DW991KS-2	DW991K drill, DW935 trim saw, & case	Sale	339

HITACHI TOOLS

C8FB	8-1/2" Slide Compound Saw	1400	575
C10FS	10" Slide Compound Saw	1595	745
P12R	12-9/32" Planer	1470	795
P12RA	Planer/Joiner	1940	995
G12SA	4-1/2" Grinder 6.9 amp	160	89
NR83A	Fram Nailer 2 - 3-1/2 Full Head	700	409
NR83AA	Framing Nailer 2 - 3-1/2	750	425
NT65A	16 ga. Brad Nailer 1 - 2-1/2	610	345
NV45AB	Coil Roofing Nailer 7/8 - 1-3/4	750	435
DN10DYK	9.6V right angle Drill Kit	350	189

BIESEMEYER FENCES

B-50	50" Commer. Saw Fence	345	298
T-SQUARE 52	52" Homeshop Fence	279	238
T-SQUARE 40	40" Homeshop Fence	259	208
T-SQUARE 28	28" Homeshop Fence	249	198

JORGENSEN ADJUSTABLE HANDSCREWS

Item#	Length	Jaw Open	List	Sale	Box of 6
#0	8"	4-1/2"	19.76	11.75	58.00
#1	10"	6"	22.63	12.50	68.00
#2	12"	8-1/2"	25.95	14.50	78.00

PONY CLAMP FIXTURES

Model		List	Sale	Lots of 12
50	3/4" Black Pipe Clamps	14.87	7.80	88.95
52	1/2" Black Pipe Clamps	12.40	6.70	71.50

BOSCH

Model	Description	List	Sale
1587VS	NEW Top Hand "CLIC" Jig Saw	292	149
1584VS	NEW Barrel "CLIC" Jig Saw	285	149
	Bosch Metal Case for above Jig Saws	34	32
	Bosch 30 blade assortment for Jig Saws		28.99
	1584VS or 1587VS with steel case and 30 Bosch blades	Sale	189
1272D	3" x 24" Belt Sander with bag.	375	209
3270DVS	3" x 21" v/spd belt sander	270	165
1276D	NEW 4" x 24" Belt Sander	379	219
1275DVS	NEW 3" x 24" v/spd Belt Sndr	379	219
1276DVS	NEW 4" x 24" v/spd Belt Sndr	408	229
1347AK	4-1/2" Grinder w/cs & access.	185	105
1194VSR	1/2" var. speed Hammer Drill	282	155
1194VSRK	above Hammer Drill w/case.	313	169
1609K	Lam Installers Kit with 1609	343	189
1609KX	Deluxe Installers kit	405	234
1604A	1-3/4 HP 2 Handle Router	250	142
1604AK	same as above w/cse & acc	318	185
1606A	1-3/4 HP D-handle Router	295	179
1613EVS	2HP v/spd Plunge Router	359	199
1615EVS	3 HP v/spd Plunge Router	505	289
1634VSK	NEW Recip Saw 10.5 amp	225	159
3051VSRK	3050VSRK w/keyless chuck	299	149
3054VSRK	12V Drill Kit w/ 2 batteries	330	185
3300K	NEW 12V Drill Kit w/ 2 batt	348	189
3310K	NEW 12V T-handle Drill Kit	348	189
3110K	NEW 9.6V T-handle Drill Kit	320	185
3107DVS	NEW 5" Random Orbit Sander	165	98
3107DVSK	3107DVS with case	195	115
3725DVS	NEW 5" Random Orbit Sander	258	149
3727DVS	NEW 6" Random Orbit Sander	268	154
B1650K	Biscuit Joiner	289	159
B7000	Corner Detail Sander	122	68
B7001	B7000 w/ variable speed	Sale	89.95
B4050	In Line Jig Saw	199	115
11230EVS	SDS-max 1-1/2" Rtry Hmr	865	525
11231EVS	SDS-max 1-3/4" Rotary Hmr	1336	809
11223EVS	NEW SDS-max 2" Rotary Hmr	1548	929
11224VSR	7/8" SDS Rotary Drill	495	229

AEG POWER TOOLS

Model	Description	List	Sale
TXE150	6" var/spd Ran Orb Sander	304	142
HBSE76S	3"x21" var/spd Belt Sander	309	182
BSPE100X	Top Handle Jig Saw w/case	286	164
FSPE100X	Barrel Grip Jig Saw w/case	274	164

PORTA NAILER

401	Porta Nailer complete	265	205
501	Face Nailer complete	265	205

BLACK & DECKER

2694	7-1/4" Super Sawcat w/case	285	158
2695	8-1/4" Super Sawcat w/case	328	179

DAVID WHITE

LP6-20	Sight Level package - 20x	310	205
LP6-20XL	LP6-20 w/9056 tripod & 7620 rod	265	205
LT8-300	Level Transit - 26x	695	449
LT8-300P	above Level w/optical plum	821	529
LT6-900	Level Transit - 20x	389	254
ALT6-900A	Automatic Level - Transit -18x	638	399
ALTP6-900A	above Level w/tripod & rod	708	479
ALP6-18HD	above Level w/tripod & rod	570	385
ML100 I	NEW Laser Level	1099	945
ML100	NEW Laser Level w/detector	1249	1075
LL100	NEW Finish Line Laser Level	210	135

RYOBI SPECIALS

RE600	3 HP Plunge Router	500	228
BE321	3" x 21" var. spd Belt Sander	310	148
BT3000	10" Table Saw with stand	1125	529
AP12	12" Bench Planer	884	395
BS900	9" Bench Band Saw	340	165
OSS450	Oscillating Spindle Sander	340	159
DC500	Detail Carver	120	64
TSS200	8-1/2" Slide Comp. Saw	895	399
CD125K	NEW 12V cdlss Drill w/ 2 batt	175	109

SIOUX TOOLS

8030	3/8" var/spd Drill	250	145
8000	3/8" var/spd close qtr Dril	201	125
690	5" Air Random Orbit Sander	139	132
Msx636 FEIN	Triangle Sander Kit	Sale	199
Msxe6362NEW	Triangle Sander w/spd	Sale	229
Msx625 FEIN	New Air Triangle Sander	Sale	189
LPN672 PONY	Air Palm Nailer w/glove	Sale	94.99
RTM01 ROTOZIP	Drywall cut out unit		68.95

QUAL-CRAFT PRODUCTS

2200	Pump Jack	79	58
2201	Pump Jack Brace	30	20
2203	Pump Jack guard rail holder	31	21
2204	Workbench & rail holder combo	53	39
	Buy any 6 (can be assort.) deduct 10%		
2601	Wall Jack	167	108
	Lots of 4 deduct additional 10%		

PORTER CABLE

444	New Profile Sander	157	94
9444	New Profile Sander Kit	205	119
7499	Ultimate Cut-out tool	113	69
690	1-1/2 HP Router 8 amp	260	142
691	1-1/2 HP Router D-handle	285	158
693	1-1/2 HP Plunge Router Base	320	178
6931	Plunge Router Base	125	79
695	1-1/2 HP Router/Shaper	400	229
696	Heavy Duty Shaper Table	230	135
351	3" x 21" Belt Sander w/o bag	280	159
352	3" x 21" Belt Sander with bag	290	165
352VS	3x21 Belt Sander w/bag v/spd	305	169
360	3" x 24" Belt Sander with bag	365	198
361	3" x 24" Belt Sander w/o bag	345	194
362	4" x 24" Belt Sander with bag	380	205
97751	1/2" v/spd Hammer Drill w/cse	270	158
9118	Porta Plane Kit 7 amp	390	225
505	1/2 sheet Pad Sander	230	128
7549	Top handle Jig Saw 4.8 amp	270	134
330	Speed Block Sander 1/4 sheet	110	62
556	Biscuit joiner w/5556 tilt fence	Sale	139
345	6" Saw Boss 9 amp	190	109
9345	345 comp. w/cse & carb blde	220	128
9647	TIGER CUB Recip. Saw	210	124
9637	Full var/spd Recip Saw 8 amp	270	148
7519	3-1/4 HP Router 2 Handle	445	244
7518	3-1/4 HP 5 speed Router	510	275
7538	3-1/4 HP Plunge Router	445	242
7539	3-1/4HP v/spd Plunge Router	510	269
7399	5.6 amp Drywall Cutout Unit	140	84
7310	5.6 amp Laminate Trimmer	165	98
97310	Laminate Trimmer Kit comp	360	198
7335	5" Rndm Orbit Sndr w/ case	245	135
97355	7335 w/ case & dust pick-up	274	138
7336	6" Rndm Orbit Sander w/ case	250	139
97366	7336 w/ case & dust pick-up	284	144
73333	Dust Collection system	31	24.50
9853	12V 3/8" Drill Kit	280	154
9855	12V 1/2" 2 spd,v/sp Drill Kit	335	178
8500	12V battery for above drills	Sale	45
332	Palm Grip Rndm Orbit Sander	120	74
333	above Sander with dust bag	135	79
334	333 Sander with PSA pad	135	79
340	1/4 Sheet Orb Sndr w/dust p/u	89	55
550	Pocket cutter with case	330	185
7700	10" "Lazerloc" Mitre Saw	634	345
310	Production Laminate Trimmer	250	145
347	7-1/4" "Framers" Circ Saw	225	129
347K	347 Saw w/ plastic case	250	134
743	347 Saw - left hand version	225	129
743K	743 Saw w/ plastic case	250	134
9743	743 Saw with case	255	139
447	347 Saw with brake	225	134
843	447 Saw-left hand version	245	139
7800	Drywall Sander	585	329
7810	Wet/Dry Vac for above sander	455	259
9737	New Tiger Recipro Saw	290	165

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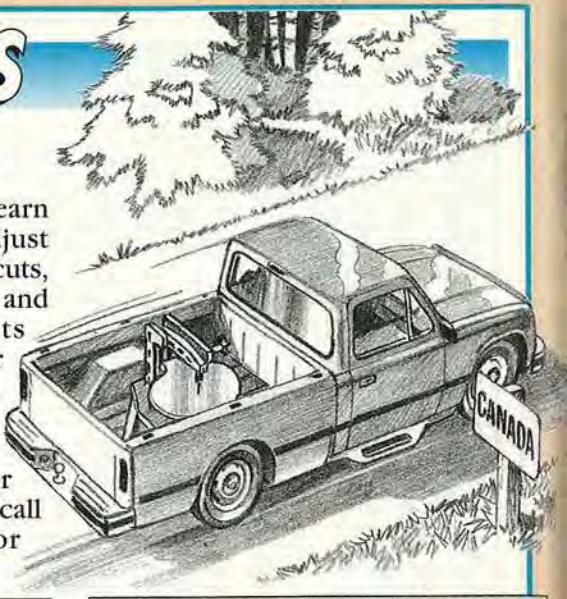
FINISHING TOUCHES

Scrollsawing through the U.S.A. and Canada

If scrollsawing's popularity ever wains, it won't be due to neglect on the part of at least one manufacturer. Advanced Machinery Imports, Ltd., distributor of Hegner scrollsaws, has put together a program of hands-on scrollsawing seminars scheduled for nearly 75 U.S. cities and 30 Canadian ones during 1996.

AMI's year-old "Scroll America" series consists of one-day workshops taught by professional scrollsawyers. Participants learn to select the right blade, adjust tension, do turns and inside cuts, tackle bevel cuts and inlays, and other techniques. Students either rent saws or bring their own. Fees are $99 in the U.S. and $149 in Canada. Enrollment is usually limited to 10 students per class. For information and a schedule, call 800/220-4264 in the U.S. or 800/220-6545 within Canada.



Plan ahead, build ahead

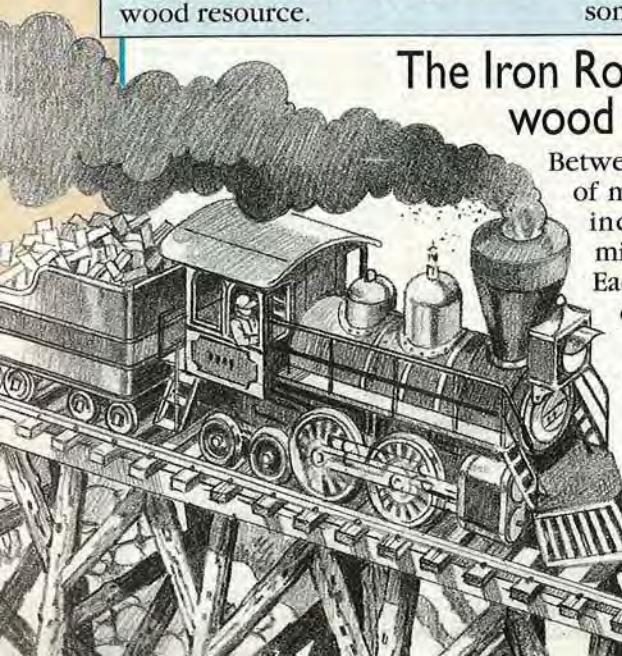
You've still got eight months to craft an entry for *WOOD*® magazine's 1996 Build-A-Toy® contest. Your entry benefits needy kids next Christmas, and you could win one of the more than $23,000 in tools and supplies we're awarding as prizes. For details, see the October 1995 issue, or write Build-A-Toy, *WOOD* Magazine, 1912 Grand Ave., Des Moines, IA 50309-3379.

Monumental trees

Ecologists and microbiologists in England have an idea for easing overcrowded cemetaries and the pollution caused by cremation, and at the same time greening up their country, reports *American Forests* magazine. In their evolving concept, people would be interned under forest trees to help enrich the soil and grow the wood resource.

The plan envisions clients choosing their own trees and the type of wildflowers to be sown around the grave. The cost of such burial will run slightly more than the present $3,000 charge for cremation, due to the associated cost of forest management. If it were to happen, such a monumental forest would be situated somewhere in northern England.

The Iron Road used more wood than iron



Between 1850 and 1910, the number of miles of railroad track in the U.S. increased from less than 10,000 miles to more than 350,000 miles. Each mile of track required 2,500 crossties, and until the early 1900s, ties weren't treated with preservative, so they had to be replaced about every five years. With the railroads' growth, more wood was also needed for cars, bridges, trestles, fuel, and station houses.

Kane hardwoods stamped okay

Kane Hardwoods, a Pennsylvania-based division of California's Collins Pine company, recently received a "well-managed" certification from Scientific Certification Systems. This means that Kane Hardwoods' lumber (primarily cherry, red oak, and hard maple) may carry the environmentally friendly label shown *above*. Kane Hardwoods and its challenge of balancing timber management and wildlife was the subject of a *WOOD* magazine article several years ago. (See "King Cherry," Issue 27, February 1989.)

Kane Hardwoods joins only five other timber producers that have so far received such certification—four in the U.S. and one in Mexico. The Oakland, California, environmental certifier sent a team of foresters, economists, wildlife biologists, and others to do the extensive field evaluation.

The northwestern Pennsylvania timber company manages 116,000 acres on the Allegheny Plateau. The company's land represents one of the last large blocks of privately owned, contiguous forest left in the Northeast.

Photograph: John Hetherington
Illustrations: Jim Stevenson

Print this article

THE DELTA Q-3.
LIKE A FORMULA RACE CAR WITH A BLADE.

We're talking pleasure here. Precision. Power. Wait 'til you get your hands on this high-performance machine. It just gets better and better around every turn. The Delta Q-3 18" Variable Speed Scroll Saw. A scroller's dream machine.

Its Quickset™ II Blade Changing System is the second generation of a Delta exclusive. The fastest in the industry. No wrenches, no aggravation, no wasted time while threading or changing blades. You'll find it on no other saw.

The arched, graphite composite arm eliminates vibration. So smooth and quiet you can listen to the sweet sound of your blade cutting wood, instead of your saw breaking the sound barrier. And at the very tip of that graphite arm you'll find the control switches. Right under your nose, instead of having to fumble around below the table.

As you'd expect, the cast iron table tilts to allow bevel cutting. But what you might not expect is the fact that the adjustable steel stand also tilts forward to give you a better view of the job, and just the right angle for comfortable operation.

This one's ready to test drive right now at your Delta dealer. If you're ready to cut circles around the rest, call us for the dealer nearest you. Delta International Machinery Corp., 800-438-2486. In Canada, 519-836-2840.

Delta is proud to nationally fund these two PBS programs for woodworkers. The New Yankee Workshop *hosted by Norm Abram and* The American Woodshop *with Scott Phillips.*

THE POWER OF THE PROS

DELTA
WOODWORKING MACHINERY
A Pentair Company

The only truck with both Magnum Power and J.D. Power.

Now it seems that Dodge Ram isn't just part of the most powerful overall line of pickups on the planet. According to a J.D. Power and Associates survey of owners,* it's also the most appealing pickup in America.

As the recipient of the prestigious APEAL award for performance, execution and layout, it's pretty convincing evidence that ignoring the rules of conventional wisdom is a very good thing to do.

It wasn't just the unmistakable look of Ram that people liked. It was the ideas and the execution they found in everything from the powertrain to the ergonomics and comfort of its interior.

Not only that, having a pickup that holds its resale value better than Ford, Chevy or GMC is pretty appealing too.**

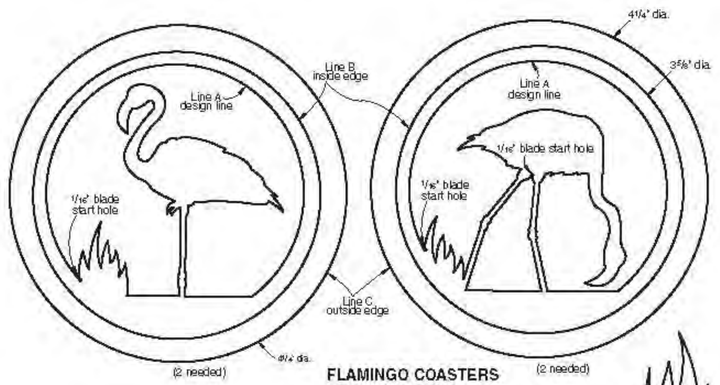
Clearly, the J.D. Power and Associates APEAL award is good news to all of us here at the New Dodge. But it's also a powerful incentive to keep looking for rules that need changing. And to keep building cars and trucks that change them.

Want more information? Call 1-800-4-A-DODGE.

*1995 Automotive Performance, Execution, and Layout Study, based on 27,859 responses. **We calculated resale using avg. trade-in values for full-size '94 models vs. MSRPs, published in '95 Jan.-Sept. *N.A.D.A. Official Used Car Guide®* monthly editions.

America's Truck Stop

The New Dodge
A DIVISION OF THE CHRYSLER CORPORATION



FLAMINGO COASTERS
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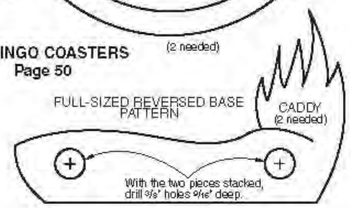

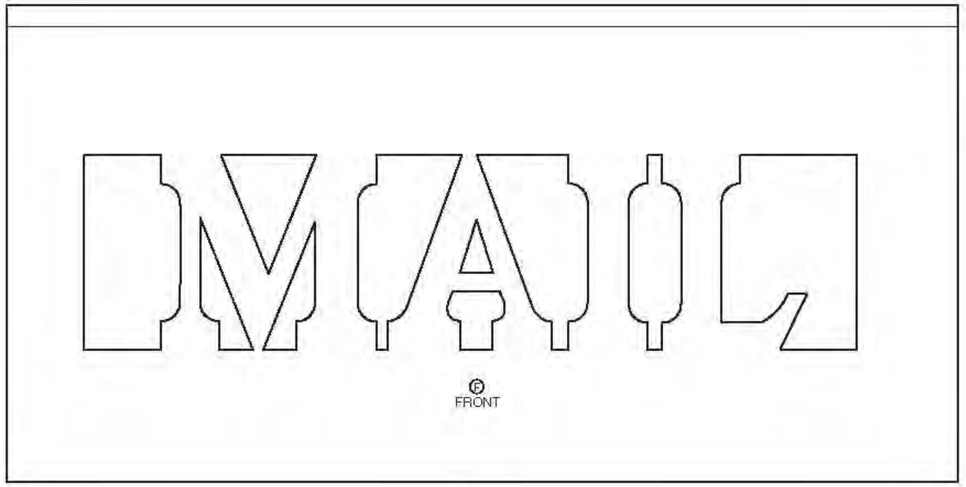

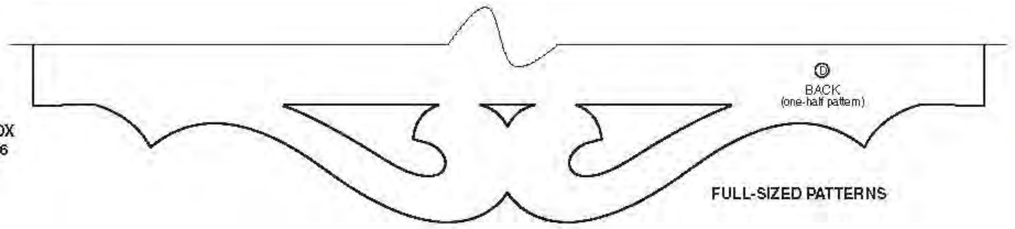

MAILBOX
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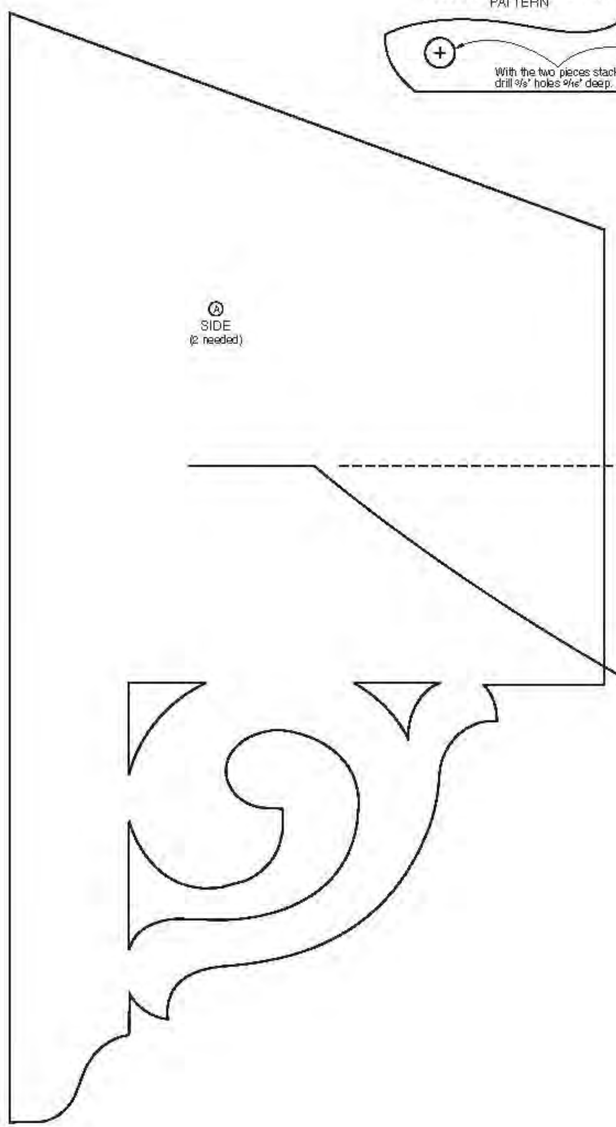
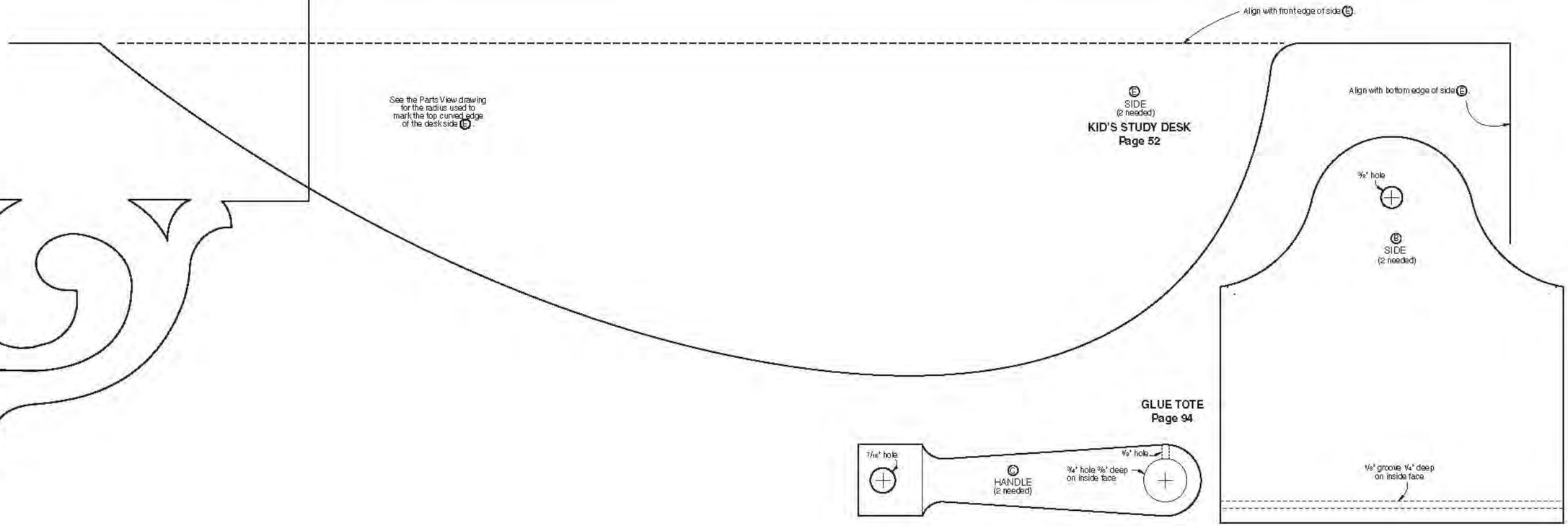
FULL-SIZED PATTERNS




Align with front edge of side E.
See the Parts View drawing for the radius used to mark the top curved edge of the desk side E.
E
SIDE
(2 needed)
Align with bottom edge of side E.
⅜" hole
E
SIDE
(2 needed)

KID'S STUDY DESK
Page 52

GLUE TOTE
Page 94

Better Homes and Gardens®
WOOD® PATTERNS™
Full-sized for your woodworking convenience
FERBRUARY 1996
ISSUE 86

Dear Reader: As a service to you, we've included full-sized patterns on this insert for irregular-shaped and intricate project parts. You can machine all other project parts using the Bill of Materials and the drawings accompanying the project you're building.

- Flamingo coasters
- Kid's study desk
- Mailbox
- Glue tote box
- Futon

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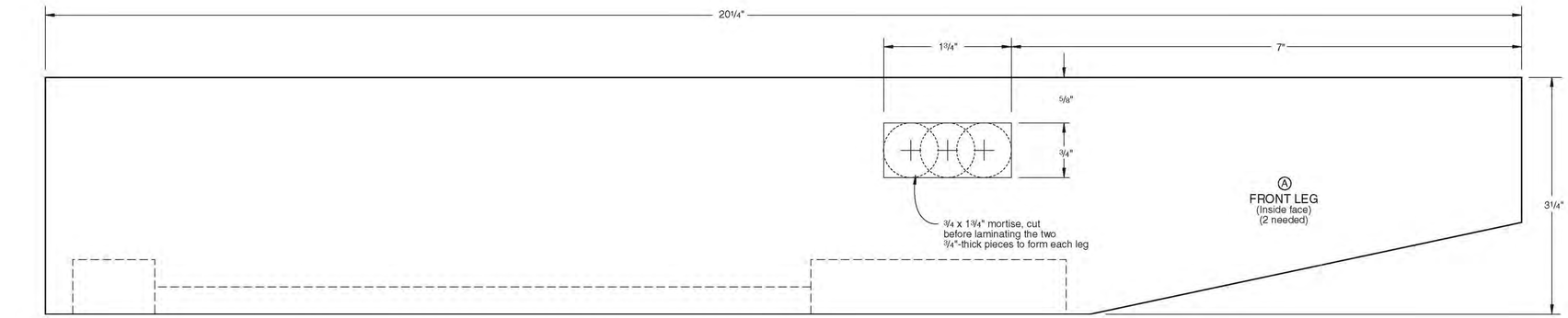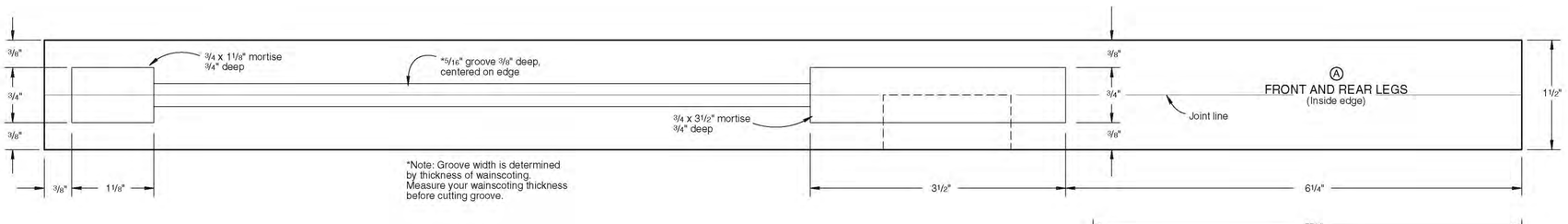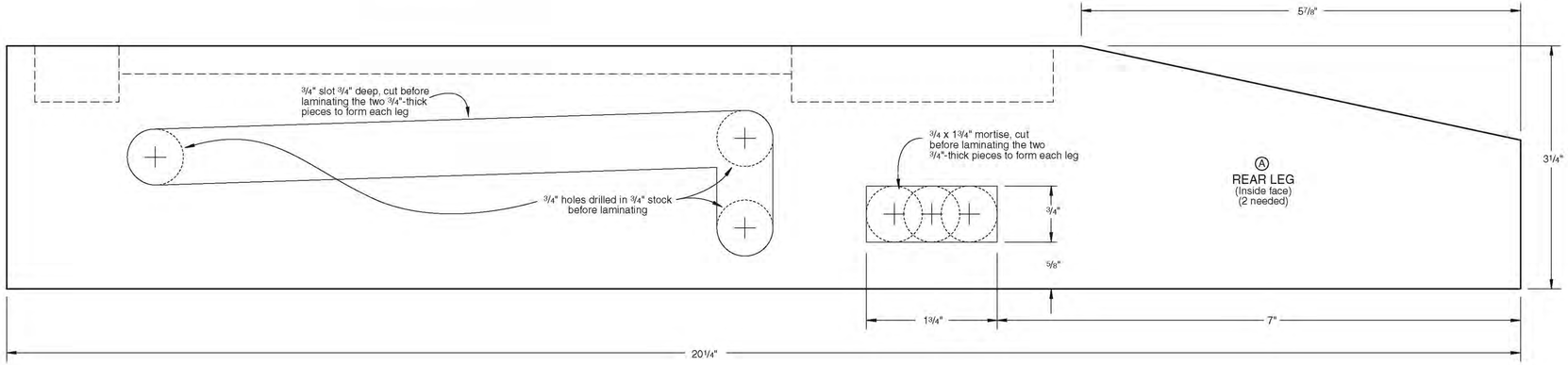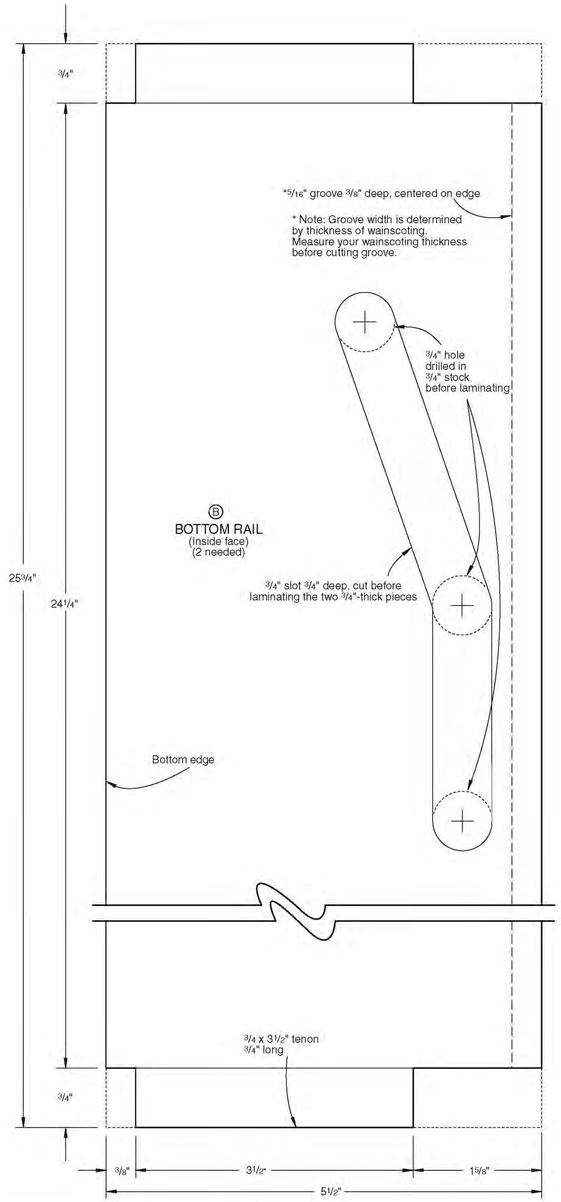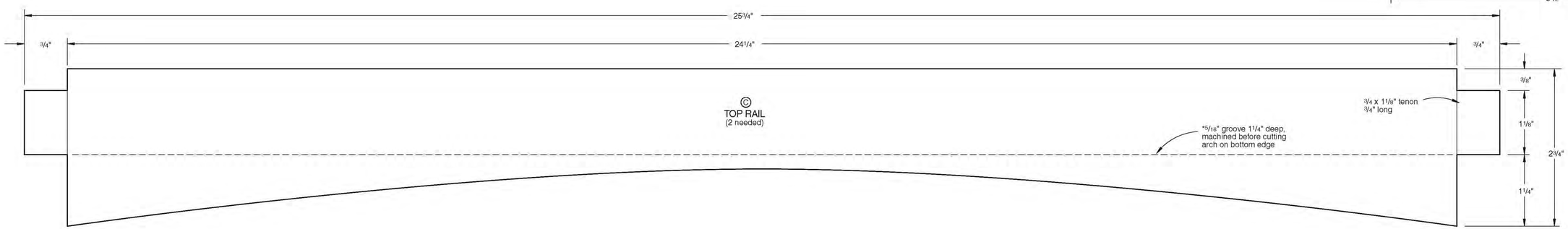
FUTON
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FULL-SIZED PATTERNS